

# The Mining Journal

LONDON, OCTOBER 14, 1960

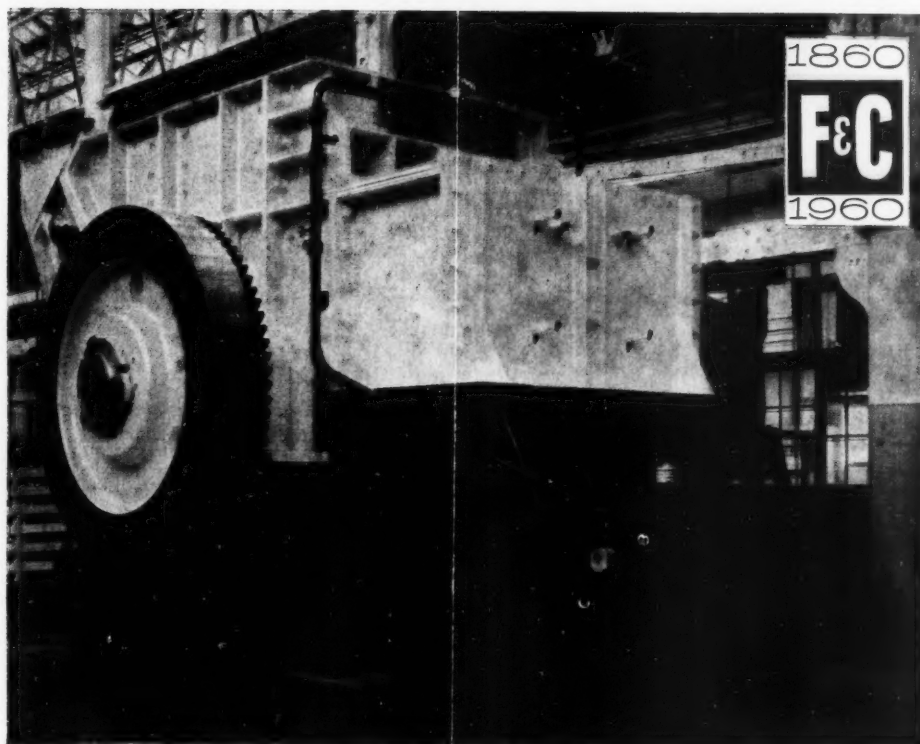
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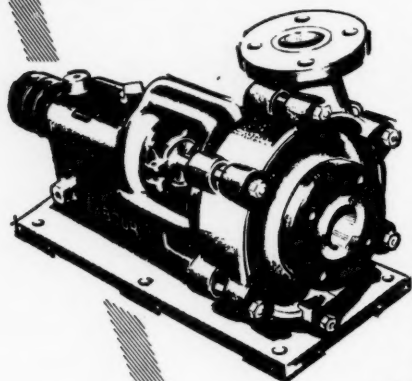
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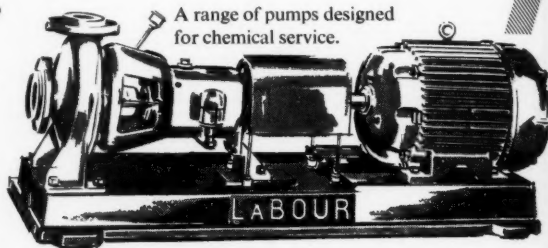


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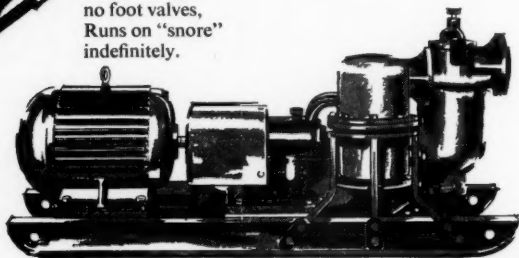


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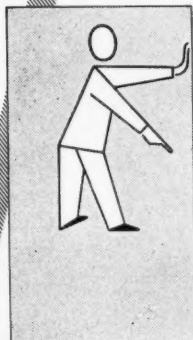
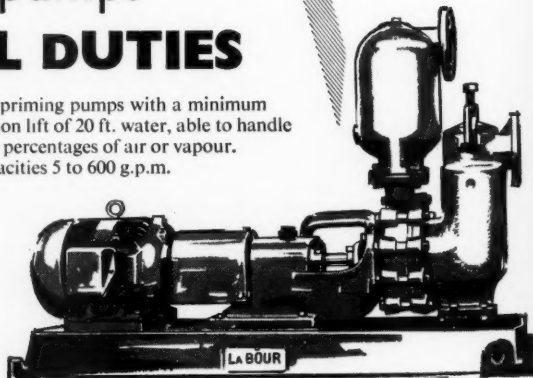
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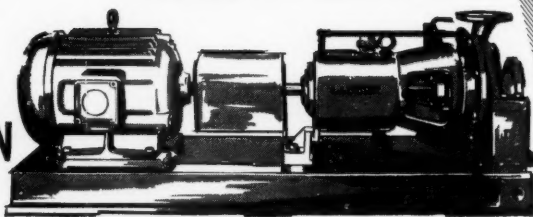


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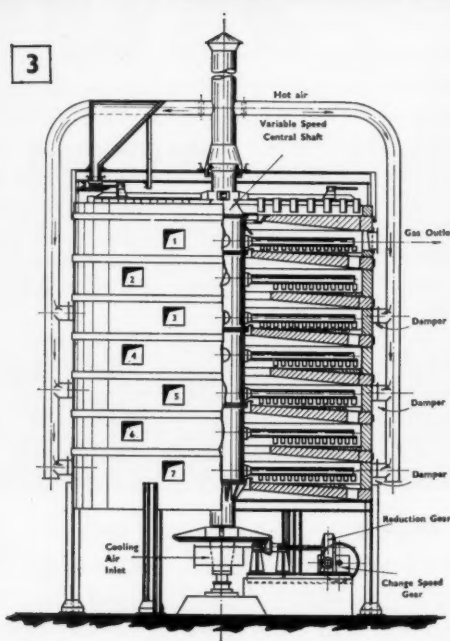
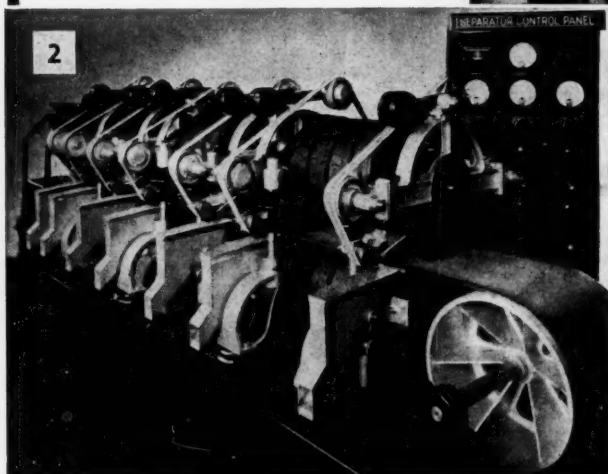
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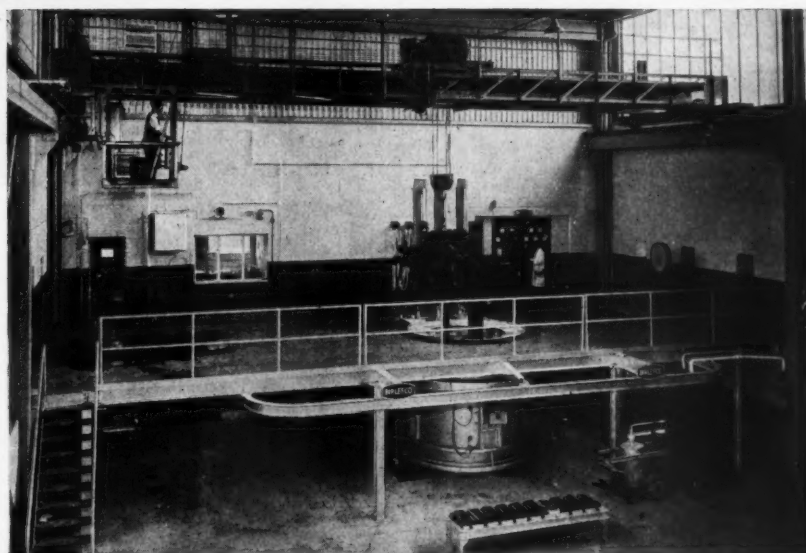
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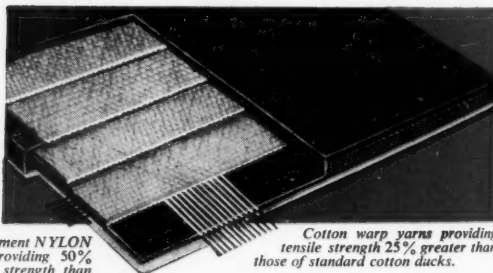
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# The Mining Journal

London, October 14, 1960

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## Locating the "Elephant Country"

**I**N contrast to the immense sums of money currently being devoted to outer space research, virtually nothing is being spent on fundamental terrestrial mineral research. Yet it is becoming increasingly apparent that greater knowledge of the fundamental principles of ore deposition is essential, if mineral discoveries are to keep pace with the growth of world demand. In the words of Dr. Anton Gray in his lecture on "The Future of Mineral Exploration" (the Fourth Sir Julius Wehrner Memorial Lecture of the Institution of Mining and Metallurgy), "when we know how the mountains are built we will have the understanding that is necessary. We will recognize how ore deposits are formed and the rocks in which to search for them".

A further indication of the growing pre-occupation of economic geologists with fundamental concepts is afforded by Dr. B. B. Brock's stimulating article, "A Philosophy of Mineral Exploration", which appears in the September, 1960, issue of *Optima*, the quarterly review published by Anglo American. The author is a consulting geologist to Anglo American and was president of the Geological Society of South Africa in 1957-1958.

Dr. Brock recalls the old tag among geologists in Africa that has been useful and appropriate from the early prospecting of the Witwatersrand and the Katanga until quite recently. It is: "If you want to shoot an elephant, you go where elephants have been shot". The application of this policy in minerals exploration involves working outwards from the known mineral deposits to find similar ones in the same environment, thus extending the known boundaries of an established mineral area. This system, as the author points out, was all very well as long as the mineral deposits occurred at reasonable depths beneath their cover of overlying rocks. But the great mining activity in Southern Africa during the past half century has revealed most of what is to be known about the accessible deposits adjacent to present or past workings, and it has been necessary to seek new "hunting grounds". This observation is, of course, no less applicable to other parts of the world where mining has been extensively undertaken. Prospecting carried out by well tried and well proved methods is yielding increasingly meagre results, for there is now less likelihood of stumbling over undiscovered major deposits than there was in the early days of mining. Hence there is a real inducement to examine or even institute new avenues of thought.

Dr. Brock's hypothesis is based on the assumption that in a well-ordered universe, where the movement of heavenly bodies is predictable, it would be incongruous if surface features of our planet were completely haphazard and whimsical. The continents, as the article seeks to show, are not evidences of disorder: they are outlined by a significant structural pattern representing major lines or zones of weakness in the crust of the earth. As a matter of observation, many mineral deposits, like those of the Andes and the Western States and Canada, are related to the coastal structural

disturbances. A successful search for mineral patterns that can be interpreted would help to find some of the answers to the fundamental question: "Why are things where they are?" and these answers must assist in a search for minerals.

From widespread observations and plausible deductions, the ultimate sources of gold and other minerals are related to major crustal cracks, which lead to the depths of the sub-crust and which served as channels for rising mineral-bearing solutions. The natural habitat of the heavier elements is nearer the centre of the earth. The continental crust, generally speaking, is composed of the very lightest kind of rock, which would exclude the heavy minerals were it not for the deep fractures which presumably acted as channel ways connecting with the depths from which they originally emanated. Thus the fracture pattern may assume a vital importance in relation to the distribution of minerals, and also in relation to geological exploration.

Whether the "geological controls" of the mineralization—the original factors that caused the deposit—are chemical or mechanical, they are usually not known until the mineral deposit has been discovered and opened up by development work. The aim proposed is to reverse the process and find mines through a better understanding of structure. The success of such a procedure has been conspicuous so far only in establishing extensions of already well-defined mineral fields, but rarely, if ever, has the procedure been used to discover new mineral deposits.

The proposed approach to exploration suggests a view broad enough to avoid getting overwhelmed by structural minutiae. Essentially, it involves the well-founded assumption that many, if not most, of the economic mineral deposits are closely related to major fractures in the crust of the earth, having used these openings as channel ways in their ascent from the depths. The task, then, is to find out all we can about such fractures, their pattern and their mutual relationships.

By relating the earth's great structural features to the globe, a broad framework is provided, on which, as we proceed from the general to the particular, as much detail can be hung as is necessary to complete the picture relating to any particular mineral or group of minerals.

Dr. Brock presents a fascinating analysis of the structural framework and traces mathematical patterns that argue strongly in favour of the relative permanence of continents. Common habits regarding shape and size of rigid units of the crust simplify the tracing of the junctions which are economically the interesting parts of the earth.

The question of why certain mineral areas are where they are is far from being answered, but it is claimed that the approach, as outlined in the article, supplies a fruitful manner of attack. Any research adds to the overall picture. Even if the entire answer is not forthcoming, the work is not wasted, because it continues to add to the empirical background.

As Dr. Brock points out, in any approach to mineral exploration there can be no magical short cut to the pinpointing of undiscovered deposits, nor in eliminating the necessity for field work. But if further research continues to clarify the structural picture, it is hoped that the result will be a higher degree of selectivity of likely prospecting areas, and the elimination of useless exploration in highly unlikely areas, thus giving geophysical methods a correspondingly better chance to prove their efficacy. The ultimate result would be a series of maps showing degrees of likelihood in prospecting for certain minerals. Much research remains to be done, however, before this stage is reached.

It is further suggested that such an approach to exploration might well open up new fields of research in all sorts of

directions which may seem unrelated or only remotely related to mineral exploration. Above all, the assumption that mathematical relationships play a part in earth patterns brings the possibility of structural prediction closer.

## ASSISTANCE FOR CANADIAN COAL

A one-man Royal Commission has recommended far-reaching changes in federal aid to Canada's ailing coal industry during the next ten years. The Commissioner, Ivan Rand, Dean of the Law School of the University of Western Ontario, proposes a system of direct subsidies to replace the existing transportation subventions.

The report states that, over the next 10 years, the annual output of Nova Scotia mines should be reduced from last year's total of more than 4,500,000 tons to a maximum of 3,000,000 tons. The effect would be the closing of four collieries in the Cape Breton area of Nova Scotia, offset by the opening eventually of one new operation.

A basic subsidy of 50 c. a ton is recommended on all bituminous coal produced in Nova Scotia, plus a social subsidy of \$2 a ton in the Atlantic provinces and the Quebec area east of Levis. At present no subsidy is paid on coal sold in that region. On coal sales in other parts of Ontario and Quebec, a social subsidy of up to \$5 a ton is recommended, which compares with the present maximum of \$8.75. In New Brunswick, Saskatchewan, Alberta and British Columbia, there would be a basic subsidy of 40 c. a ton on coal mined underground and 30 c. on that obtained by stripping. In New Brunswick there would be a social subsidy ranging from 40 c. to \$2.70.

The basic subsidy is intended to help existing coal mines to maintain "at least skeletal operations", while the social subsidy would provide for the protection of coal towns threatened with abrupt collapse. It is understood that initially the cost of the proposals would be in the region of \$14,500,000 a year, which would be \$1,000,000 lower than the total cost of last year's federal subventions.

Critics of the report maintain that many Western underground mines would be crippled by these proposals, since they now receive up to \$4 a ton subvention on coal shipments to Central Canada. They would also be hard hit by the Commissioner's further recommendation that subsidies on coal exported to Japan should be abolished. The Commissioner has stated, however, that the aim of his subsidy proposals is to assist coal production to a better competitive position in its own market—the Maritime and Eastern Quebec areas, not the markets of Ontario where U.S. coal and Canadian oil and gas are battling for sales. He has described as "an ultimate in absurdity" the present system whereby coal is sent for 1,000 miles to compete with a foreign fuel.

## MINING IN MOROCCO'S FIVE-YEAR PLAN

Within the framework of Morocco's new Five-Year Plan, a total of 10,000,000,000 francs will be invested in expansion of the mining industry, according to Abdelhafid Kadiri, Director of the Bureau de Recherches et de Participations Minières (BRPM), whose agency has plans for opening up new lead, zinc, manganese, pyrites and potash mines in the near future.

The BRPM is a state-controlled agency which conducts its own mining operations, either alone or in association with private enterprises. As a holding company it has stock in 36 Moroccan mining companies, worth

20,766,000,000 Moroccan francs, 21,080,000 French francs plus 117,681,800 pesetas.

Next October a pilot plant, including mill and washery, will go into operation on the Moulouya Valley lead-zinc ore deposit, discovered two years ago by the BRPM, where reserves of 6,000,000 tonnes have been confirmed with a lead metal content of three per cent. This plant will serve to provide the information needed for commercial production which is expected to start in two year's time. The aim is to produce up to 3,000 tons of ore daily and to invest up to 2,000,000 Moroccan francs, of which a maximum of 50 per cent will be put up by the BRPM.

A smaller lead-zinc deposit between Gourrama and Beni Tadjit in the Bou Arhous Mts. is due for exploitation soon by SOGEMI, a mixed French-Moroccan company with a capital of 122,000,000 francs, of which the BRPM holds 50 per cent. Surveys of five more lead-zinc deposits, in the High Atlas, are also to be undertaken by BRPM.

In two years' time, when current studies are completed, it is hoped to be able to start full-scale mining operations for manganese in the Taourirt-El Aioun area of N.E. Morocco. In the past these deposits have been neglected in favour of the richer deposits at Bou Arfa and Imini which, however, are expensive to operate because of their great distance and transportation difficulties. At Taourirt-El Aioun, the ore is of a much lower grade but has the advantage of being situated only 30 km. from a railway and 100 km. from the coast.

The decision to construct a chemical industry at Safi, based on phosphates from Louis Gentil and natural gas from Mogador, has made it possible to envisage the development of several new iron and copper pyrites mines to supply Safi where triple phosphates, phosphoric and sulphuric acids and ammonia are to be manufactured. The BRPM and the Compagnie Minière et Métallurgique (a French group) have already started joint operations on the Kettara deposits of pyrrhotite. With smaller deposits in the Chemaia, Anti-Atlas Mts. and Azgour areas, it is expected to have reserves of up to 7,000,000 tons of iron pyrites to supply the Safi industries.

Copper pyrites for the same complex will come from deposits in the Beni Zadi, Sidi Mahrouf and Chemaia areas where surveys are to be accelerated by the BRPM in 1961. Surveys are also to be undertaken of copper ore deposits in the Maider area of E. Morocco (Tafilale), but production is envisaged only if oil is found in the South.

What Mr. Kadiri described as "an enormous potash deposit" at Khemisset in central Morocco will be developed by the BRPM in association with the Mines Domaniales de Potasse d'Alsace. Annual production is expected to be at least 200,000 tons, 75 per cent of it for export.

## MINERAL DISCOVERIES IN INDIA

A pipe containing diamonds of rare variety has been discovered in the Majhagawan diamond mines in Panna district, India. According to an official announcement, it was discovered during a survey and exploration of the area being conducted by the Geological Survey of India.

Mr. Lawrence Blade of the United States Geological Department came to India under a TCM project to investigate the possibilities of commercial exploitation of base metals in various parts of India. He has already completed his survey in Himachal Pradesh and in Madhya Pradesh. After submitting a report of the result of his investigations in Salem and Nilgiris to the Government of Madras, he proceeded to Calcutta, headquarters of the Geological Survey of India with which he has been col-

laborating as an adviser for about two years. He has stated that the occurrence of iron and bauxite in the Shevroy Hills and Nilgiris is fairly widespread and offers great scope for commercial exploitation.

Extensive sources of sulphur pyrites have been discovered in the Amjore area in Bihar, and have been described as large enough to meet India's sulphur requirements. India at present imports sulphur worth several crores of rupees annually.

## ORE CONCENTRATION PLANT IN ARCTIC SWEDEN

A new ore concentration plant and an extension of the existing pelletizing works were inaugurated at the LKAB iron ore mines at Malmberget in Arctic Sweden in September. The new installations have called for investments of about Kr.50,000,000 (£3,500,000) and form part of LKAB's large scheme for expanding and modernizing its mining and shipping facilities at a cost of some Kr.100,000,000 per annum. Through this and other extensions, the annual output of the Malmberget mines will be almost doubled to approximately 6,000,000 tons of ore by 1965. This compares with about 15,000,000 tons a year for LKAB's largest mines, situated at Kiruna to the north of the Malmberget district.

The new concentration plant at Vitafors just outside Malmberget, is dimensioned for an annual capacity of 1,200,000 tons of coarse dressed ore of up to 72 per cent Fe, three times as much as the output of the old works—in operation since 1914 but now closed down. In spite of the trebling of the productive capacity, the high degree of automatization in the new works has made it possible to reduce the working staff from 70 to 30 men. At the same time, the capacity of the pelletizing works has been doubled to 350,000 tons a year. The Malmberget ore contains unusually large crystals, which facilitates a high degree of concentration and also makes it possible to produce pellets of extraordinary purity.

The modernization of the underground mining operation has included the installations of industrial television and centralized traffic control for the underground railway network covering most of the 190 miles of galleries. Two new shafts with towers 50 m. high have also been sunk to the mining level 500 m. below. Besides being used for their main purpose of transporting ore, they will also help solve the transportation problem of some 500 miners, who will now be able to travel to their working places by bus above ground instead of by underground trains. In some cases the saving in time will be up to 40 minutes per worker and shift.

The new plant was designed by the LKAB company's own technical department, and has a total volume above ground of 248,400 cu. m. (324,560 cu. yds.). As with the big ore dressing plant completed at the company's Kiruna mines a few years ago, the new plant is clad with maintenance-free aluminium plate delivered by the Svenska Metallverken. The building contains eight decks. After having been crushed and sorted below ground, the ore arrives on conveyors to the upper deck, and from there proceeds stepwise downwards, going through various processes of grinding to an ultimate granular size of 0.08 mm., separation and drying. The ore concentrate, holding 70-71.3 per cent of iron and with moisture content of 8 per cent, is collected on the first floor while the slime proceeds to three sedimentation basins with a diameter of 17.5 m. on the ground floor. The purified water is pumped back into the plant, which requires 34,000 litres per min. with a refilling of 7,000 litres to replace the quantities used for removing the slime from the basins.



# Principles and Applications of Electrostatic Forces

The First International Colloquium on the Principles and Application of Electrostatic Forces was held at Grenoble from September 27 to October 1. This Congress, organized by the Société Anonyme des Machines Electrostatiques, S.A.M.E.S., and held at the Technical Institute in Grenoble, was attended by approximately 90 delegates. The original programme listed nine papers, devoted to mineral dressing applications, but only five were actually tabled and of these only four were presented by the authors. Open discussions led by Testut, Barthelemy and Le Baron were organized to fill the gaps left by defaulting contributors. Congress members were able to visit the Grenoble Centre of Nuclear Studies, the S.A.M.E.S. factory and Serre-Poncon, site of the largest earth dam in Europe. With the exception of the proceedings of the first day, three groups, Generation, Precipitation and Mineral Beneficiation, were run simultaneously. This report is contributed by Dr. A. J. Robinson, head of the Mineral Processing Division, Warren Spring Laboratory

THE colloquium was opened by Mr. Neel, Director of the Electrostatic and Metal Physics Laboratory of the National Centre for Scientific Research. The hope was expressed that exchange of ideas would promote research and a wider interest in the use of electrostatic forces.

Three papers were delivered and discussed on the first day, dealing with generators<sup>1, 2</sup> and precipitation<sup>3</sup>. Speakers emphasized the favourable power/weight ratio and efficiency of electrostatic generators when compared with electro-magnetic machines, and the slow rate of application was deplored. It was generally admitted that drum type generators were preferable to disc type variable capacitance generators, and were best adapted for general use since commutator and many constructional problems were avoided.

The drum generator is replacing Van der Graaf machines, in the field of nuclear research and training, for the production of neutron and ion beams. These generators are inherently current limiting, and short circuiting or sparking presents no hazard for the operator or the machine. The universal acceptance of electromagnetic generators precludes a wider application of electrostatic machines, except for specialized uses, in the near future.

It was considered that the low power/weight ratio of these machines would make them attractive for power generation in outer space, and a preference was expressed for multiple plate machines which operate satisfactorily in high vacuum.

The theory of operation of electrostatic precipitators, with the exception of particle charging, which is soundly based on the work of Pauthenier<sup>4</sup> was debated at some length. No new explanations were given for the behaviour of 0.2 to 1.0 microns particles which fall between the zones of "diffusion" and "field" charging. No soundly based reasons were given to explain reverse charging, re-entrainment, the formation of agglomerates, sparking or corona field distortion.

Methods proposed for the design of precipitators were based upon empirical measurements of migration rate and resistivity obtained during plant operation. Correlation of precipitator performance with chemical, mineralogical and surface properties of the material being precipitated has not apparently been attempted. The increasing demands for clean air, and legislation would appear to assure increasing activity and a promising future for operators in this field.

That no one uses electrostatic concentration until all other methods have failed would be a fair summary of the opinion of most of the delegates. Research and the development of new machines would, it was considered, lead to a wider use of this method of concentration, which offers considerable scope for mineral separation. Considering the potential applications of this method of beneficiation it was surprising that such little research is actively in progress. The discussions centred around the two methods of operation, one utilizing drum type separators for corona or electrostatic separation, and the other employing parallel plate or free fall type separators.

The use and positioning of supplementary electrodes with induced roll separators was discussed, and attempts were made to explain the distribution of conductors and non-conductors on the basis of rate of dissipation of charge and non-uniform charging. However, it is unlikely that any satisfactory explanation will be given until more is known of the specific surface conductivity of particles and the shape and nature of the ionizing field of corona discharges.

A film and paper<sup>5</sup> by Le Baron described new separators under development in the International Mineral Corporation laboratory. Single high potential electrode separations of pre-charged material were illustrated using a charged belt or a vibrating feeder. A fluo-solid type separator, utilizing frictional charging and parallel electrodes was also briefly described. It was claimed that free fall type separators have a much higher capacity than roll type machines. Examples were quoted of the separation of apatite from quartz and feldspar from quartz, the pre-conditioning and charging techniques were not described.

A paper by Plaksin<sup>6</sup> described the use of alpha-radiation from a polonium coated corona electrode to increase the ion beams given by an ordinary corona discharge. The results were inconclusive. A second paper was presented which described the classification of plus 40 micron material. The subject matter was covered in a paper presented to the I.M.M. in August of this year.

Rabrenovic<sup>7</sup> described the recovery of magnetite, haematite, limonite, ilmenite, rutile, titaniferous haematite and chromite from a very low grade sand deposit. Desliming and Humphrey spiral concentration yielded a gravity concentrate, 2.5 per cent by weight and assaying approximately 11 per cent  $\text{Cr}_2\text{O}_3$ , 4½ per cent  $\text{TiO}_2$  and 27 per cent Fe. Magnetite separation, before and after magnetic roasting removed the iron minerals as two concentrates assaying



53 per cent and 60 per cent Fe, 4 per cent and 2 per cent  $\text{Cr}_2\text{O}_3$  and 6 per cent and 4 per cent  $\text{TiO}_2$  respectively. Electrostatic separation of the non-magnetics at room temperature using a negatively charged electrode gave an ilmenite concentrate, and subsequent roll separation using a positively charged electrode gave a chromite concentrate. Applied voltage and electrode spacing were such that no corona would be formed. Concentrate grades 25 per cent  $\text{TiO}_2$ , 8 per cent  $\text{Cr}_2\text{O}_3$ , and 43 per cent  $\text{Cr}_2\text{O}_3$ , 5½ per cent  $\text{TiO}_2$ , were uninteresting by marketing standards, but the unusual behaviour of the minerals after roasting was of interest.

Tombs<sup>9</sup> presented a paper describing a seed sorting device in which a colour sensing element, based upon photo-electric cells, activated an electrostatic charging probe. The selected charged seed was then deflected from the free-falling main stream during its travel past parallel charged plates. The capacity was 2-3 tons/day for peas, and good sensitivity to small colour changes and blemishes was claimed.

Using an applied voltage of 3,000 to 8,000 volts/c.m. on a corona wire inside a 44 mm. diameter cylinder, Challande<sup>10</sup> described the collection of particles ranging

in size from 100 angstroms to 10 microns. The particles are caught on desensitized photographic paper, and particle density is determined optically.

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## THE USE OF BELT CONVEYORS IN METAL MINES — III

**M**ANY manufacturers have directed their attention towards the development of flexible high strength conveyor belting. Typical of these materials are nylon and terylene.

The tremendous improvements in mining efficiency which have been made in the past decade or so have thrown increasingly severe strain on equipment and there is every prospect that this will become still greater during the next few years. While modern machinery is built specially to cater for these arduous conditions, it is only fairly recently that any great thought has been given to conveyor belts.

This vital link in the sequence of operations is something which many mining engineers have taken very much for granted. Certainly, belts have been built from heavier ducks and with more plies but there is a quite definite limit to progression of this nature. Factors such as flexibility, toughness and power consumption become critical.

Development is now at the stage where the limit is very near. In some installations it has already become necessary to strike a compromise between strength and durability and flexibility. Since a conveyor belt has many inherent advantages over other methods of shifting ore, there is natural reluctance to dispense with it. Fortunately new materials make it possible to increase the strength and toughness of belting without increasing its thickness or diminishing its pliability.

The most promising of these new materials is nylon which, during the past 18 months or so, has started coming forward strongly. Not only does it have tremendous tensile strength but it also possesses several other properties which make it a particularly attractive proposition.

Most of the nylon used in conveyor belting is Type 600, an extra-high tenacity yarn developed by British Nylon Spinners Ltd., specially for uses such as tyre cord and conveyor belting. It has a tenacity of 8.8 grams per denier which is equivalent to a breaking stress of about 57 tons per sq. in. and is the strongest textile yarn which can be used for belting.

It can be used to make belts stronger without increasing thickness; it can be used to make belts of the same strength

The article appearing herewith is the concluding instalment of three in which the use of the belt conveyor as a medium of transportation in the metal mining industry has been discussed. These final remarks discuss modern developments in belting construction, notably the use of nylon and terylene

but less thickness; it can be used to achieve a compromise between greater strength and less thickness. Broadly speaking, the weight of a standard all-cotton belting duck is increased by 75 to 100 per cent if the cotton weft is replaced with nylon so it is often possible to make a reduction in the number of plies. By using nylon in the warp as well as the weft it is possible to produce even tougher ducks.

Besides great tensile strength, nylon also has greater powers of energy absorption than any other textile fibre. Type 600 nylon yarn extends between 12 and 17 per cent before it breaks. From extensions of up to eight per cent it recovers immediately. Belting containing nylon is thus able to withstand very severe shock loads and to withstand repeated shock loads for a very long time.

Another feature of nylon is its excellent fatigue resistance. It can withstand repeated bending and flexing without any weakening whatever. Combined with this it has excellent flexibility so that belting containing nylon can operate satisfactorily on small pulley diameters. Nylon's resistance to abrasion is greater than that of any other textile fibre and this is a key factor in helping to minimize the damage caused to belting by edge chafing.

In addition, nylon has excellent wet strength. Complete saturation reduces the tensile strength of Type 600 yarn by about 10 per cent but this is regained completely when the yarn dries out. Since all nylon yarns are inherently rot-proof there is no risk of damage by moulds or fungi.

There are many ways of utilizing nylon in belting. It may be employed as weft yarn across a conventional cotton warp. It may be used as a mixture with cotton in both warp and weft. It may be used for the whole of the

textile component to produce still greater strength—a development which has particular attractions for long-centre working. One of its most interesting features is that it opens up completely new possibilities and paves the way for the adoption of new methods which may ultimately revolutionize the design of conveyor installations.

During the past 18 months or so the use of nylon in conveyor belting has progressed very rapidly in Britain and there is no doubt that this country is now leading the world in this development. At the present time the belts being used most extensively are those with nylon in the weft. These were the first plied belts to contain nylon—chiefly because the most urgent need was to increase lateral strength—and they are now being produced by all leading British conveyor belting manufacturers. They have created world-wide interest and besides being used extensively in Britain quantities have been sold to many European continental countries and to India, Malaya, Chile, Canada, Australia and South Africa.

Many of these nylon-weft belts contain fewer plies than their all-cotton equivalents but are notably stronger. On the one hand, they have higher safe working stress ratings and better resistance to impact damage, longitudinal tearing and edge wear. On the other hand, they are lighter in weight, more flexible, have better troughing properties and can operate on smaller drum diameters. Furthermore, they have better resistance to fastener pullout. They require less power to drive them, make it possible to operate at longer centres and they last longer, reducing the carrying cost per ton of material.

#### Ranges and Installations

These advantages are shown up very clearly by data supplied by Barrow, Hepburn and Gale Ltd., whose range includes nylon-weft belts with safe working tensions of up to 100 lb. per in. width per ply. They point out that the working tension of a five-ply belt based on their CN/80 duck, for example, is the same as that of a nine-ply belt based on 42 oz. cotton (360 lb.). Its thickness, however (without covers), is little more than half as much (5/16 in. against 19/32 in.); it weighs only 32 oz. per sq. ft. instead of 49 oz. per sq. ft.: correct troughing can be obtained with a 36 in. belt instead of a minimum of 60 in.

George Angus and Co. Ltd., produce a comprehensive range designed to match or exceed the tensile strength of all-cotton belts but with one ply fewer so that they are more flexible and have better troughing properties.

One of the biggest nylon-weft belts yet in use is a 1,000 ft. long and 48 in. seven-ply belt by the Goodyear Tyre and Rubber Co. (Great Britain) Ltd., which is handling nitrate-bearing ore in Chile. This system on which it is installed handles 1,700 tons per hr. of 1½ in. fines and is driven by a 250 h.p. motor at a speed of 510 f.p.m. This belt is from a range rated at 15 per cent higher per ply inch than standard belts built from cotton. Others are in use in the new £4,000,000 ore preparation plant in a huge Derbyshire ironworks. One carries coke breeze to the sinter plant and another carries raw mix to the sinter plant.

The range of nylon-weft belts produced by the Greengate and Irwell Rubber Co. Ltd. includes a series based on a 28 oz. fabric with safe working tensions 25 per cent higher than belts based on 32 oz. cotton and with tear strengths almost four times as great.

BTR Industries Ltd. produce a complete range of nylon-weft belts with safe working stresses ranging from 40 lb. to 200 lb. per in. width per ply. (Where very high tensile strengths are required the nylon weft is used across a warp of other man-made fibres instead of cotton.) Big orders which have been received for this include 72,000 ft. of

24 in. wide five-ply belting for an iron ore installation in Chile.

The Dunlop Rubber Company Ltd., produce a range of nylon-weft belts rated nearly twice as strong as conventional all-cotton belts. A three-ply belt is equivalent to a five-ply based on 32 oz. cotton; four-ply is equivalent to seven-ply and five-ply is equivalent to nine-ply. George MacLellan and Co. Ltd., have a range in which a five-ply nylon-weft belt is equivalent to a six or seven-ply all-cotton belt.

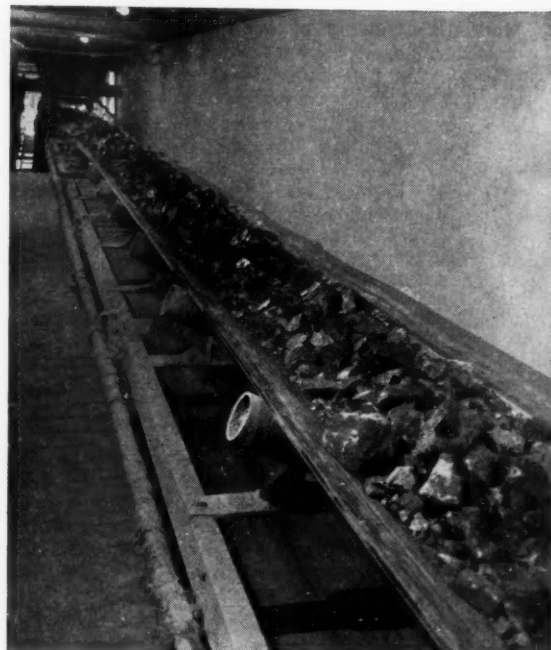
The range produced by the U.S. Rubber Co. Ltd., includes belts with safe working tensions of up to 200 lb. per in. width per ply. Even the lightest of these have rip ratings well in excess of that for 42 oz. cotton. For the toughest of them all it is more than four times as great.

#### Further Examples

Among the nylon-weft belts by Turner Brothers Asbestos Co. Ltd., which are already in action are three which have been supplied to a mine in Africa where they are handling 550 t.p.h. of mine serpentine ore up to 14 in. lumps at a speed of 176 f.p.m. Altogether 1,790 ft. of 42 in. six-ply belting is in use on three conveyors. The belts have a ¼ in. face cover with nylon breaker strip and a 1/16 in. back cover and were chosen for their excellent impact resistance.

For similar reasons a nylon-weft belt by the same firm has also been installed in a West Country quarry where it handles 100 to 150 tons of granite per hour at a speed of 175 f.p.m. up a 16 deg. incline. This belt is a 36 in. four-ply with 3/16 in. face cover and 1/16 in. back cover. While nylon-weft belts are gaining widespread popularity, British conveyor belt manufacturers are already producing

Installed in a West Country granite quarry, a cotton warp/nylon weft belt by Turner Brothers Asbestos Co. Ltd., carries 100 to 150 tons per hour of granite up a 16 deg. incline at a speed of 175 ft. per min. The belt is four-ply, 36 in. wide and has Grade "A" rubber covers. ¼ in. face and 1/16 in. back. A nylon-weft belt was chosen because of its ability to resist damage from occasional large lumps



still tougher belts based on fabrics composed of mixtures of nylon and cotton in both warp and weft.

David Moseley and Sons Ltd., for example, produce belting which in four-ply construction has a tensile strength of 2,300 lb. in the warp and 1,300 lb. in the weft and a tear strength of 200 lb. In five-ply construction its tensile strength is 2,800 lb. warp, 1,600 lb. weft and the tear strength is 250 lb.

F. Reddaway and Co. Ltd. produce a range of belts containing nylon in both warp and weft which are 50 per cent stronger in the weft and 25 per cent stronger in the warp than similar belts based on all-cotton ducks. Prolonged tests have shown that these belts are 60 per cent less liable to damage at the loading point when handling large or heavy lumps of material. Several have been supplied for use in tin mines in Malaya; others have been shipped to the Congo.

Use is also being made of PVC-covered solid-woven belting containing nylon. Based on a relatively thick and heavy fabric composed of a number of plies which are bound together during actual weaving (instead of being subsequently laminated together) this type of belting was, in fact, the first to contain nylon and has been manufactured in Britain for 10 years or so. Today all top quality British solid-woven belting contains a substantial proportion of nylon in both warp and weft.

British Belting and Asbestos Ltd. produce solid-woven belting which is 50 per cent stronger in the warp and twice as strong in the weft as equivalent belting based on all-cotton fabric. J. H. Fenner and Co. Ltd., who have manufactured several million feet of solid-woven belting containing nylon during the past five years, have supplied quantities for tin mines in the Far East and for gold and copper mines in Africa.

Meanwhile, work goes ahead with the development of belts based on ducks composed wholly of nylon. Trials have already produced some exceedingly encouraging results. The advantages of such belts are considerable. With the exceptionally high tensile strengths that can be achieved with nylon, they are ideally suited to meet the rigorous demands imposed by the trend towards longer centre working. Furthermore, they are completely and inherently rot-proof and can work under constantly damp conditions, even if the cover is damaged, without fear of premature failure. Their introduction may exercise considerable influence on conveyor design.

#### Pioneer Terylene Reinforced Belt

The high strength and excellent stretch properties of terylene filament yarn, which it retains fully when wet, make it ideal for belting and hose reinforcement. High flexibility, low stretch, toughness, resistance to rot and chemical attack, non-absorption of moisture and compatibility to blending with cotton are its main attributes in belting, and better belts can be made for a wide variety of duties with terylene in the duck. Long hauls are made possible, and extra heavy loads can be carried; chemical and heat resistant belts can be greatly improved, and spillage can be eliminated by taking advantage of the flexibility of the light, strong belting by deep troughing.

One example of how running expenses can be minimized and the number of maintenance shutdowns lessened is given by this story of one of the first terylene reinforced belts ever made.

The natural first step in evaluating terylene in conveyor belting was to construct a belt on the same lines as one with conventional cotton reinforcement, using terylene instead of cotton. A belt made this way, with 5 ply 32 oz. terylene duck, was installed at a quarry in North Wales



A terylene reinforced belt

to see if an improvement could be effected in the short life of about a year obtained with 5 ply 32 oz. cotton duck belting.

Although by present standards, where 15 oz. duck is that most commonly used in 100 per cent terylene reinforced belting, this early terylene belt was extremely expensive, it ran well for 2½ years, carrying 838,000 tons of rough limestone against 320,000 usual for cotton reinforcement. It was then taken out of service because of damage to the covers, but the duck was still serviceable and was recovered as a spare. Despite the high cost of the development belt, the cost of running the installation was £500 less than it would have been with cotton duck belting over a similar period. Even when the replacement for the first terylene belt was only being considered, terylene was the obvious choice and for it a lighter duck was used—24 oz. This belt did even better than the first, carrying over 1,000,000 tons of limestone in the same conditions, lasting three years and five months (against the 320,000 tons and one year of cotton). The original, recovered terylene belt is now back in service.

Thus, over a period of six years, two terylene belts have done work which it would have taken probably five cotton belts to do; saving shutdown time, trouble, and money—and the carcass of the first belt is still working.

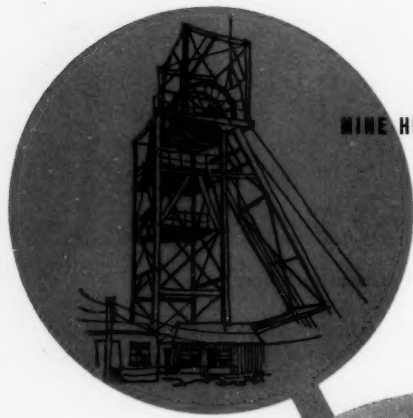
Years of development work in all fields of belting by belting manufacturers co-operating with I.C.I. Fibres Division have resulted in there being terylene belts on the market now to meet practically all duties. Terylene reinforced belts are now running successfully in many different industries at home and abroad.

Prices have come down since the trials described here were started, and terylene belting to do similar work would now cost much less. One hundred per cent terylene reinforcement is still basically dearer than cotton—between 5 and 50 per cent, since except where very heavy cotton belting would be used, a straight terylene strength-for-strength equivalent would not have enough bulk, but the basic properties will have improved by much more than the increase in cost.

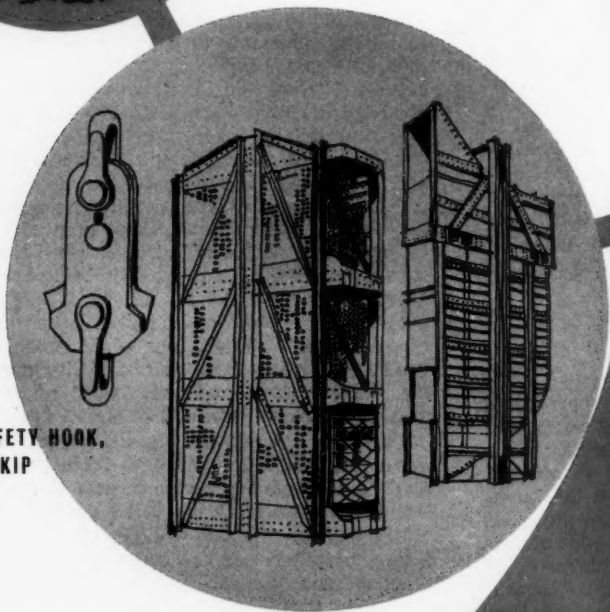


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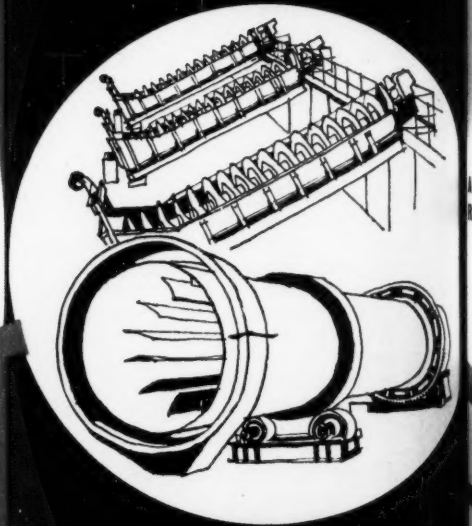
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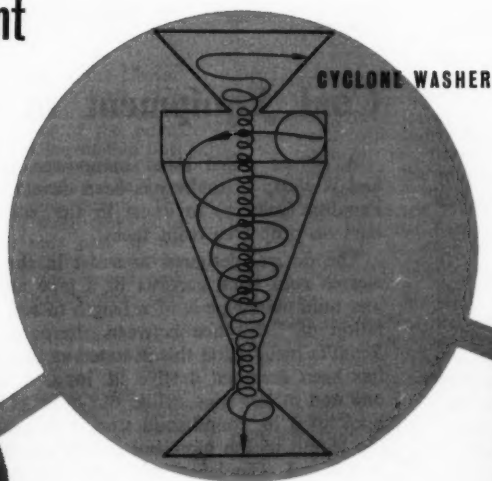
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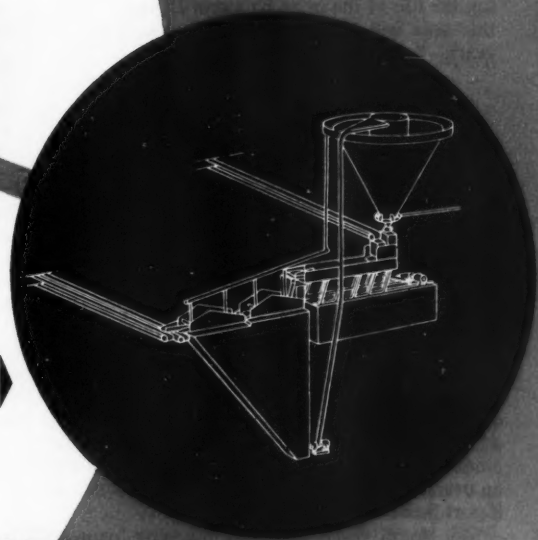
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# Coal Mining in Australasia

**L**ATEST news reports from Australia and New Zealand, indicate the health of the coal industry in Australasia.

## Strip Mining in New Zealand

At Kimihia, New Zealand, a lake is being removed to allow for stripping of the underlying coal deposits.

A bank dam was constructed at the lake and the water thus contained was pumped clear. On the newly dried floor area, spoil removal was then commenced by drag-line. Four TS-300 motor scrapers and a pair of HD-21 crawler tractors aided in stripping, the scrapers being utilized to remove a layer of sediment about 20 ft. thick lying directly above the coal.

At a current coal production rate of 1 ton per min., overburden must be removed at a 10 ton per min. rate. To accommodate this demand, ten Allis-Chalmers T360 tractors with rear dumpers, a number of HD-21 crawlers and HD-6G and HD-9G tractor shovels have been added to the removal team.

Coal is extracted by a  $\frac{1}{4}$  yd. shovel and conveyed by belts. An HD-6G in the working vein assists in coal handling and spoil removal and aids in maintaining output at approximately 500 tons per shift.

About two years ago a further portion of the lake was enclosed to contain 2,750,000 tons of coal, thus extending the life of the mine by some 25 years. A dredge within this area will have pumped clear the water in some five years.

## Survey in New South Wales

An instructive survey of the coal mining industry in New South Wales has come from E. E. Warren, Chairman, Australian Coal Association. He writes that in the past seven years coal in New South Wales has been on a rising output trend, while production economics resulting from mechanisation have improved the competitive position with oil. Coal stocks in the last year dropped by 265,000 tons to approximately normal levels, while the State consumption, with interstate exports to June 20, 1960, totalled 14,547,000 tons, compared with 14,127,000 tons in the previous year. In addition, a promising export trade has been built up which amounted to 1,070,000 tons in 1959-60 and prospects are for an overseas trade of possibly 3,000,000 tons per year by 1965, if port facilities are improved.

New South Wales mines are planning for major increases in output to satisfy growing demands for electric power generation, steelmaking, and the export trade. Four new collieries with a combined capacity of about 4,000,000 tons per year are being developed, to supply these needs. Introduction of coal washing, covering half the total output, has meant an average increase of about 4 per cent. in the heat value of coal delivered to the consumer compared with 1951.

Between 1953 and 1960, prices for coal delivered to general industry in Sydney dropped from an average of £5 per ton to £4 5s. 0d. This is equivalent to 4.49 pence per therm in 1953, and 3.66 pence per therm in 1960, a therm being 100,000 B.T.U's. Average calorific value of industrial coal is 12,400 B.T.U's. It is notable that the fall of 18 per cent in the cost of heat from coal occurred over a period in which the basic wage

rose 18 per cent from £12 3s. 0d. to £14 8s. 0d. In the period reviewed costs of oil to the consumer have risen 9 per cent while the cost of coal has fallen by 18 per cent.

J. and A. Brown, Abermain Seaham Collieries Ltd. are commencing to open up a new coal mine at Chain Valley Bay on Lake Macquarie, New South Wales. A vertical shaft is to be sunk, and two cross measure drifts. The mine will be one of three new underground coal mines to be opened up in the locality to supply coal to the new Vale's Point power station, now being built on the shore of the lake. One will be opened by the State Mines Control Authority, and the third by the New South Wales Electricity Commission. The three mines will supply coal by continuous conveyor belt systems to a storage bin at the power station. It is anticipated that each mine will be opened up with a daily output of 2,500 tons of coal. Ultimately, the Vale's Point power station might consume up to 10,000 tons of coal per day. The mines will be equipped with the most modern mechanical mining plant.

Development in the coal mining industry is extending to the production of metallurgical coke to meet the needs of industries other than the steelworks. In addition to the demand by Mount Lyell copper smelters, and Mount Morgan, increased supplies will be needed for the nickel industry in Noumea.

## Coal Equipment in the U.K.

A device which saves manpower, gives added safety, and is cheap to make has been developed at the N.C.B.'s Penallta Colliery, to assist in the erection of cantilever bars on prop free front faces.

The device, designed to assist in the erection of Vanners roof bars, consists of a pipe and lever. The 1 in. dia. mild steel pipe is of a length to suit the support stipulation of "distance between alternative bars". In the Penallta installation this is stated as being 4 ft., so the pipe has been designed 4 ft. 6 in. long. A hook is welded to one end of the pipe, while the other is belled. A similar hook of  $\frac{3}{4}$  in. round mild steel is free to be moved along the length of the pipe, but is retained on the pipe by the belled end. The lever, which has serrated edges, is made from  $\frac{1}{2}$  in. round mild steel.

Without the invention, two men are required to erect the bar when the seam section is low, one man holding the bar to the roof while the other secures it, and the conveyor has to be stopped. With the invention, it is no longer necessary for men to be astride the conveyor, so that they do not have to encounter the danger of being under an exposed roof, while the chance of injury to men due to inadvertent starting of the machine is also eliminated.

When enough roof is exposed to require the extension of a bar in cantilever on to the roof, the forward jaws of the bars on either side are situated approximately along the centre line of the panzer conveyor. The pipe is suspended by hooks from the two bars. The bar to be erected is lifted on to the pipe, the mate end of the bar located in the jaw of the standing bar and the hinge pin located. With one hand the propsetter uses the lever to raise the bar against the roof, while the other hand is used to locate the locking pin, and hammer it into position. As the panzer machine does not have to be halted for the erection of bars, there is more ploughing time—the time saved representing an increase in output of as much as over 50 tons per shift.

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## Machinery and Equipment

## An Electrically Operated Face Drainage Pump

An electrically operated 2 in. Univac self priming centrifugal pump is now being produced by Henry Sykes Ltd. for face drainage duties, where relatively low heads and high suction lifts are encountered. The maximum head with this pump is 60 ft., the maximum useful suction lift being, however, 26 ft., allowing the pump to be located well clear of the face whilst maintaining its rapid self priming ability combined with high output. The pump has a capacity of 6,500 g.p.h., when operating on a suction lift of 10 ft., at a nominal head. At nominal lift and a total head of 20 ft., the output is 8,000 g.p.h. The pump will pass solids of up to 1 in. diameter and will pump slurries of up to 60 per cent solids content. On a 10 ft. suction the pump will prime in 12 sec., whilst on a 28ft suction the priming time is 65 sec.

The operating principle of the Univac pump consists of the maintenance of a partial vacuum in two chambers which are above the centre line of the pump and which precede it in the suction line. These chambers are interconnected and the partial vacuum is maintained in them by a small rotary vacuum pump. The function of the first of these tanks is to gather any air which may pass up the suction line and to maintain a reservoir of water, the duty of the second tank being to prevent water reaching the vacuum pump.

The pump and impeller have been designed to handle sludges containing appreciable solids in addition to duties where only clear water is involved. The pump castings are thus of close grained cast iron, as are the casing wearing plates and the impeller. The shaft is of mild steel with renewable sleeves and is, in effect, the extension of the motor shaft. The pump is thus close coupled to a 3 H.P. English Electric 3 phase 50 cycle 400/440 volt motor although other motors may be fitted as required where, for example, flameproof operation is specified or where operation is in the range of 100 to 600 volts. The overall length of the unit is 3 ft. and the width is 1 ft. 6 in. The height is 3 ft., the total weight being 480 lb. net.

### SAFE RECOVERY OF COAL PILLARS

Techniques for safely and totally extracting pillar coal with continuous mining machines are explained in a U.S. Bureau of Mines publication recently released.

Information used in the report is based on observations in several commercial coal mines. Text and illustrations explain how safe and successful pillaring (especially the removal of final stumps in lifts or the final stump of a pillar) is accomplished in some mines while

others have considerable difficulty under similar conditions. Uses of both boring- and ripping-type continuous mining machines in five representative bituminous seams of differing characteristics are described.

Report of Investigations 5631, *Extracting Final Stump in Pillar and Pillar Lifts with Continuous Miners*, can be obtained from the Publications-Distribution Section, Bureau of Mines, 4800 Forbes Avenue, Pittsburgh 13, Pa. It should be requested by number and title.

### SHAFT SIGNALLING SYSTEM

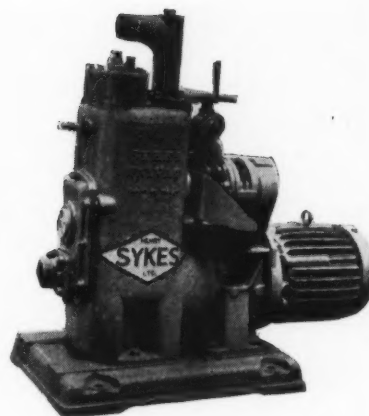
The increasing number of skip winding plants being brought into operation has created a need for a shaft signalling system which will enable full advantage to be taken of the faster speed and larger capacity of this method of winding. The newly developed Type 57 system by Automatic Telephone and Electric Co. Ltd., has been designed to meet this need. Its chief advantage is that it enables all signals to be sent by the single momentary operation of the appropriate push-buttons; this both eliminates the tedious task of impulsing by hand and reduces the possibility of conflicting signals. The audible signals are transmitted automatically and at constant speeds. A complete miniature indicator panel at each level keeps all personnel fully informed as to the movements of the cage and gives each on-setter visual confirmation of the signal he has sent. The system is extremely simple to use and, in the event of an emergency, could be operated by unskilled personnel.

Each shaft signalling level is served by its own level relay group and signal marking and counting circuit relay group. A cancel relay group is common to all the other relay groups. These relay groups are mounted on a telephone equipment type rack and totally enclosed in a dust-proof steel cabinet.

The relay equipment operates from 24 volts d.c. and two batteries are provided, one on charge, the other on discharge. In addition to the normal 15 amp. switch fuse, local fusing for each of the "level" relay groups is provided.

The push-button units and miniature indicators are available for flush mounting in control and mine car handling desks, or as individual or composite units for wall mounting. The winding room equipment comprises a signal indicator panel, bells for level signals, a hooter for emergency stop signals and a signal cancelling device.

The Bank (Coal) position equipment comprises a signal indicator panel, bells, a strip of 12 push-buttons for signalling



The electrically operated Sykes UVS2 Univac pump

to winding room, emergency stop button and lock-out switch. This equipment will generally be mounted in the Bank control desk. At the Bank (Men) position the same equipment is provided with the addition of a set of automatic "reply" push-buttons, one for each underground inset. The Pit Bottom (Coal) position equipment also consists of a signal indicator panel, signalling push-buttons, emergency stop button and lock-out switch.

### EQUIPMENT FROM HUNGARY

Two new pieces of mining equipment are announced from Hungary. The first is an opaline-scale shaft plumbing device. In wet shafts, the use of opaline for scale and background plates cuts out light reflection by water drops and facilitates scale reading, this being possible in as little as a quarter of the duration needed if conventional apparatus is used. The scale unit is separated from the fixing unit, thus obviating the scale's movement during mechanical fixing. Reading precision has been improved to a margin of error of between 0.1 and 0.2 mm., as against a usual margin of 0.5 and 1 mm. In a test operation, the complete shaft plumbing operation was undertaken in 1 hr. 40 mins., instead of the customary 4 to 5 hrs.

The second development reported is a proton-precision magnetometer for geological survey, a prototype of which has now been completed by Hungary's geophysical measuring instruments factory. This device uses the most modern methods for the determination and recording of the various chronological variations in the magnetic field within the crust of the earth.

Successful experiments have been carried out in Hungary's Komló coal region with deep soaking of coal seams to combat silicosis. Water is injected into the coal face at 200 at. pressure through holes drilled 15 to 20 ft. deep. This has been found 80 to 90 per cent effective as a dust-binder, and what is more the water pressure so loosens the coal that cutting is 10 per cent more productive.



## MINING MISCELLANY

The Commodity Credit Corporation has announced in Washington that it will accept offers to barter U.S. surplus food for various metals including antimony and tin. Other metals and minerals listed include certain grades of bauxite, beryl, cadmium, chromite, fluorspar and manganese.

Three Vancouver companies participating in a joint exploration programme have staked some 67 claims covering what is described as an "interesting showing" of tungsten in the North-west Territories. Work has been suspended on the claims, but it is understood that diamond drilling will probably be started about June next year. The companies concerned are Centennial Mines Ltd., Magnum Copper Ltd., and Canex Exploration Ltd., who are associated with Placer Development Ltd. in the programme.

Europe's biggest aluminium rolling mill is now in production at the Rogerstone, Monmouthshire, works of Alcan Industries Ltd. (formerly the Northern Aluminium Co.). The nominal capacity of the mill has been increased from 50,000 to 70,000 tons a year, with a substantial extra capacity for hot rolled coil and plate, by the expansion and modernization of the continuous strip mill at a cost of about £7,000,000. This

is part of a four-year expansion programme which is expected to cost some £10,000,000. The mill is now equipped to produce a greater diversity of products, including aluminium plate up to 11 ft. wide. Provision is made for an eventual increase to 175,000 tons nominal annual capacity.

The Manila Mining Corporation has announced the discovery of two new veins at its potential gold mine in Agusan, Mindanao (the Philippines). One of the veins is reported to average better than 1 oz. for a known length of 300 ft. Other potential mines being developed by the company in Agusan include a large low-grade deposit estimated to contain about 4,000,000-5,000,000 tons of 1.17 per cent copper, partly blocked out by trenching, tunnelling and diamond drilling; and a deposit occurring in the form of many narrow high-grade copper-bearing veins, uncovered during the first half of 1959, which is described as ranging from 6 in. to 4 ft. in width and carrying 5-15 per cent copper.

The Venezuelan Minister of Development has stated that, by agreement with the Strategic Materials Corporation, New York, the national steel plant will use the Strategic-Udy process for the direct

and selective reduction of the country's complex ores.

October 1 saw the start of production at No. 1 blast furnace of the iron and steel works at Lhasa, the construction of which started on May 31 this year. Hitherto, Tibet has been the only administrative region in China which produced no iron.

A new mineral containing 30 per cent zirconium and externally resembling quartz has been discovered on the Kola Peninsula of the Soviet Union, it has been announced. The mineral has been named "Vlassovit" in honour of Director Vlassov of the country's Academy of Sciences.

Early 1961 has been set as the date for the start of exploitation of the Akjoujt copper ores in the African republic of Mauritania. The exploiting company, Société des Mines de Cuivre de Mauritanie (Micuma), plans to start by mining the deposit's oxide ores. These total some 7,500,000 tonnes of 2.8 per cent copper minerals, as against an accompanying 18,000,000 tonnes of sulphide ores with only 1.7 per cent copper content. The first stage of exploitation by the half publicly, half privately owned concessionary is estimated to cost some 70,000,000 new francs. Micuma shareholders are Bureau de Recherches Géologiques et Minières, the Mauritanian Government, Banque de Paris et des Pays-Bas, Pennaroya and Minerais et Métaux.

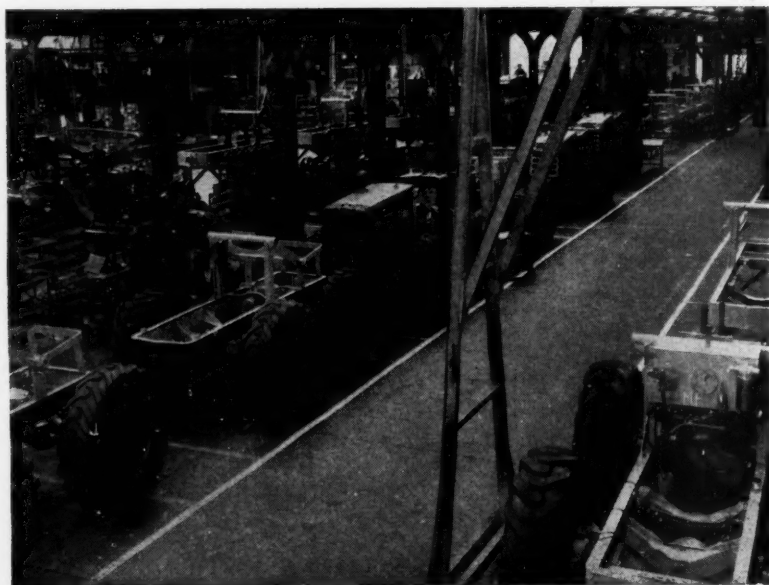
By 1965, it is announced from Bucharest, Roumanian iron ore production is planned to reach an annual level of 4,000,000 tonnes, as compared with an output of only 1,064,000 tonnes last year. Other targets for 1965—last year of the coming Five-Year Plan—include coking coal 6,000,000 tonnes (1959: 4,100,000 tonnes) and crude steel 3,300,000 (1,410,000 tonnes). A new aluminium plant with an annual capacity of 50,000 tonnes is also to be constructed in Roumania within the framework of the 1961-65 plan period.

According to the East German news agency ADN, a number of new mineral deposits have recently been discovered and in some cases are already being exploited in Albania. These include reserves of ferro-nickel ores at Cervenike, chrome ore at Martenesch, hard coal at Alarup, and natural gas at Marinze. Initial explorations have also been made for minerals for alumina production, as well as sand for the glass industry.

The little town of Indwe in the Eastern Cape Province, South Africa, has become a centre of geological activity almost overnight in an intensive search for coal deposits. Drilling machines, geologists and other staff have appeared on the scene, and last week an airfield was completed for a mining company which has been surveying the area. Preliminary reports are reported to have been favourable.

Sr. Luis Mackenna, manager of the Chilean Central Bank, has accepted an invitation to act as mediator in the conflict between Anaconda and the Chuquibambata mine strikers.

On Friday last week in the Orchid Room of the Dorchester Hotel, London, Mr. A. J. F. Andrews, managing director of Michigan (Great Britain) Ltd., officially handed over the 1,000th British-built Michigan unit to Mr. Kenneth McAlpine. The machine has been purchased by Sir Robert McAlpine and Sons Ltd. Two and a half years ago the first British-built Michigan tractor shovel came off the line at Yorktown Works, only a few months after the decision to set up a manufacturing organization in the United Kingdom to build Michigan construction equipment. Twenty-one months later the production line had expanded to build six different tractor shovels and 500 British-built machines had been delivered to work in the U.K. and overseas. A pioneer in the use of four-wheel drive rubber tyred equipment, Michigan produce six tractor shovel models in series production at Camberley ranging from 1 cu. yd. to 8 cu. yd. capacity. Illustration shows the Michigan production line



Sasol, the world's largest oil-from-coal plant, is to spend another £3,500,000 in order to increase production to 40,000,000 gallons of petrol a year. Last year this South African plant produced 35,000,000 gallons and had a turnover of £8,197,000. The new development scheme is to be partly financed from income and its completion (by the middle of next year) will round off the first phase of development costing £48,000,000.

The Pakistan Industrial Development Corporation has prepared plans for the complete reorganization of the coal mining industry in West Pakistan. The plans are estimated to cost Rs. 70,000,000, the foreign exchange component being Rs. 50,000,000 to be used mainly on the import of machinery and mechanical handling equipment. The present consumption of coal in Pakistan is about 2,200,000 tons a year, of which 1,500,000 tons are imported from India and other countries and the remaining 700,000 tons are produced in Pakistan. Investigations by experts, it is stated, have indicated that West Pakistan's coal resources, if properly developed, are capable of meeting the entire local demand.

West Germany is expected to export 28,000,000 tons of coal this year against 22,000,000 tons in each of the two previous years (excluding the Saar region), according to Herr Kurt Haver, director of the co-operative office of the three West German coal sales combines. The director stated that there was heavy competition in coal exports with the U.S., Britain and communist countries.

## Personal

Dr. William B. Agocs, formerly director of geology and geophysics of Aero Service Corporation and affiliates, has established offices in Philadelphia as a natural resources evaluation consultant (domestic and foreign), utilizing geological-geophysical survey procedures.

Mr. A. R. Jackson has been appointed to the board of the Consolidated Pneumatic Tool Co. Mr. Jackson will continue as general manager in charge of the company's Australian branch.

Ferodo have announced that Mr. P. Blandford has been appointed manager, Technical Sales, of their company, and will head a department handling liaison with technical and design staffs at home and abroad.

Mr. W. M. H. Stevens, has been appointed deputy chairman and joint managing director of Firth Cleveland Pumps Ltd., Premier Works, Earl Shilton, Leicester, a member of the Firth Cleveland Group. Mr. Stevens was formerly the technical director of Bowser International Ltd.

Mr. H. D. Wallach has been appointed vice-president and general manager of Howe Refining Co., a subsidiary of Howe Sound Company (NYSE). Mr. Wallach was formerly vice-president of the non-ferrous division of Frank Samuel & Co.



A Green Bond belt manufactured by Rubber Improvements Ltd., and installed by Boksburg Crushers, South Africa, is reported as having been the means of solving difficulties arising from increased tonnages. In addition, the installation placed limitations on the increase in the number of plies of cotton duck which could be employed. Statistics of this installation were length 800 ft., speed 600 f.p.m., tonnage 600 t.p.h., incline 18 deg., a stretch of 8 in. in eight months. The driving motor was 75 h.p. Green Bond P.V.C. terylene based belting is the latest development by the Wellingborough Research Laboratory of the company. The belting now operates in gold, copper, uranium, coal and iron ore mines in South Africa, Canada, Poland, Belgium, New Zealand, Rhodesia, Turkey, Greece and India. The N.C.B. is a large user

Mr. J. S. Brough has been appointed to the board of Mono Pumps Ltd. as assistant managing director.

The annual meeting of A.I.M.E. in St. Louis. Dr. Cummins will continue as president until then.

The Metallurgical Society of the American Institute of Mining Metallurgical and Petroleum Engineers announces the election of Mr. J. S. Smart Jr. as president for 1961. Mr. Smart is general sales manager of the American Smelting and Refining Co. He succeeds as president Dr. C. C. Long, director of research, Zinc Smelting Division, St. Joseph Lead Co. Others elected to office at the A.I.M.E. annual meeting by The Metallurgical Society are Mr. K. L. Fetters, vice-president and president elect. Mr. Fetters is vice-president of research and development. The Youngstown Sheet and Tube Co.

Mr. A. F. Epstein has joined Ayrton and Partners Ltd. He will be in charge of the ore department.

We regret to report that Mr. D. M. Davidson, president of the E. J. Longyear Co. U.S. and a geologist with a world-wide reputation, died suddenly at his home on September 15. He was 58. He had been president of the Longyear Co. since June, 1958.

The Society of Mining Engineers, a constituent organization of the American Institute of Mining, Metallurgical, and Petroleum Engineers, has announced the election of Mr. J. C. Gray as president for 1961. Mr. Gray is administrative vice-president, Raw Materials, U.S. Steel Corp. He will succeed Dr. A. B. Cummins, N.J., on Feb. 28, 1961, during

The Consolidated Pneumatic Tool Co. Ltd. have announced the appointment of Mr. Jack Gibson as managing director of their South African subsidiary, the Consolidated Pneumatic Tool Co. S.A. (Pty.) Ltd., Johannesburg.

The American Institute of Mining, Metallurgical, and Petroleum Engineers has elected Mr. R. R. McNaughton president for 1961. Mr. McNaughton will take office on Feb. 28, 1961, during the Institute's annual meeting in St. Louis. He is manager of the Metallurgical Division of The Consolidated Mining and Smelting Co. of Canada, Ltd. Mr. McNaughton will succeed Dr. Joseph L. Gillson, who continues as president of A.I.M.E. until Feb. 28. Dr. Gillson formerly was chief geologist of E.I. du Pont de Nemours and Co.

Mr. G. R. Seshadri, editor of the *Eastern Metals Review*, Calcutta, has arrived in London. He is visiting the United Kingdom for a month at the invitation of the U.K. Government.

Professor B. Bleaney and Dr. James Cook have been appointed members of the Council for Scientific and Industrial Research. Together with a third member yet to be appointed, they succeed Prof. P. M. S. Blackett, Sir Eric Ashby and Mr. H. Douglass, who have retired on completion of their period of service.

## Metals and Minerals

## De Beers Decide To Make Synthetic Boart

In November last year Mr. Harry Oppenheimer announced that De Beers Consolidated had developed a method of making synthetic industrials of the same type as those manufactured by the U.S. General Electric Co. His statement said that it would be technically and economically possible for De Beers to proceed to manufacture on a commercial scale if it was found desirable to do so, but that there was no immediate prospect of the company manufacturing synthetics. No decision, it was added, would be taken without close co-operation with the Société Minière du Bécéka, which produces the great majority of the world's supply of the competing natural material.

It seems reasonable to infer that De Beers' brilliantly successful research, undertaken during a period when production of natural boart was running slightly ahead of demand, was intended as a form of assurance not only against any future shortage but also against technological changes which might confer a cost advantage on synthetics. Hence it was to be expected that sooner or later manufacture would be started, on however small a scale, in order to keep abreast with General Electric in the technical know-how of commercial production.

Mr. Oppenheimer has now announced the company's decision to proceed with

the production of synthetic crushing boart in a factory to be erected in the Union, using a process based on the company's own research. This decision has been taken in view of the uncertain outlook for the production of crushing boart by operators in the Belgian Congo. The undertaking will be financed privately by De Beers with participation by the Société Minière du Bécéka.

It is expected that the factory will start commercial production about the middle of next year in time to avert any possible shortage resulting from the running down of existing stocks. The precise stock position has not been disclosed, but Mr. Oppenheimer has described stocks of the natural product held by the Diamond Corporation as being ample to supply normal market requirements until about the middle of next year. By that time, with reasonable luck, operations will have resumed in the Congo. In the background there is also, of course, the American stockpile of undisclosed but very large dimensions, which would doubtless be drawn upon by the U.S. Government should any squeeze be caused by a prolonged interruption of Congo supplies. The U.S. Government stopped buying industrial diamonds for the strategic stockpile in 1957, but stockpiling was resumed in the following year.

Assuming no further deterioration in

the General Congo situation, the outlook for natural boart supplies seems reasonably encouraging. Although Bécéka's operations are at present completely suspended, it is hoped that production can be resumed on a limited scale before the end of the year. The Société's European employees are reported to be available and willing to carry on, but the African workers, understandably, are not prepared to return until the exceptional fierce tribal fighting in the Kasai has died down. It has been stated that they are already beginning to come back.

In the Kasai district (Tshikapa), where the output includes a substantial proportion of gemstones, operations are still in progress.

## SMELTER-SKELTER

Just how uneconomic can you get in the interests of self-sufficiency? The question is prompted by a report from New York that Mr. Khrushchev has offered to supply Bolivia with a tin smelter. He appears to have given no indication as to whether this would be a gift or whether Bolivia would be expected to pay for it. The head of the Bolivian delegation, adds the report, has asked Mr. Khrushchev to put the offer in writing!

So Bolivia with its uneconomic tin mines might yet find itself saddled with a smelter which, operating on Bolivian ores alone, could only push the industry more deeply into the red.

What with two smelters projected for Nigeria, talk of another in Indonesia, and now, it would appear, the possibility of yet another in Bolivia, the fact that the Free World already has twice as much smelter capacity as it is currently using is obviously neither here nor there!

One wonders, too, whether the Russians have had any experience of smelting Bolivian ores by themselves. If not and assuming that Bolivia really set its heart on a smelter, would Russia be the right country to supply the know-how which could make the project, however uneconomic, at least technically feasible?

Doubtless Mr. Khrushchev's offer, however lightly made, was very kindly meant—or was it?

## WOLFRAM AND THE B.O.T.

A narrower range of 140s. to 150s. per l.ton unit c.i.f. Europe is now indicated in London for wolfram ore, compared with 140s. to 155s. previously and with 154s.-159s. as quoted in our last week's issue. The weakening on the market in the past few days comes after a period of steadiness lasting for several weeks and is attributed largely to increased sales by the Board of Trade, which in turn tend to reduce demand in the open shipment market.

After the Board of Trade had been unable to make any sales for some months, a bid was accepted for a large quantity of ore from the strategic stockpile at a price well below the bottom of

## LONDON METAL AND ORE PRICES, OCT. 13, 1960

## METAL PRICES

Aluminium, 99.5%, £186 per ton	Magnesium, 2s. 2½d./2s. 3d. lb.
Antimony—	Manganese Metal (96% 98%) £275/£285
English (99%) delivered, 10 cwt. and over £200 per ton	Nickel, 99.5% (home trade) £600 per ton
Arsenic, £400 per ton	Osmium, £18/£22 oz. nom.
Bismuth (min. 1 ton lots) 16s. lb. nom.	Osmiridium, nom.
Cadmium 10s. 6d. lb.	Palladium, Imported, £8 12s. 6d.
Cerium (99%) net, £15 0s. lb. delivered U.K.	Platinum U.K. and Empire Refined £30 5s.
Chromium, Cr. 99% 6s. 11d./7s. 4d. lb.	Imported £28½/£28½
Cobalt, 12s. lb.	Quicksilver, £70 ex-warehouse
Germanium, 99.99% Ge. kilo lots 2s. 5d. per gram	Rhodium, £43/£45 oz.
Iridium, £20/£23 oz. nom.	Ruthenium, £14/£16 oz. nom.
Lanthanum (98%/99%) 15s. per gram.	Selenium, 50s. 0d. per lb.
	Silver, 79½d. f. oz. spot and 79½d. f.d.
	Tellurium, 28s. 6d. lb.

## ORES AND OXIDES

Antimony Ore (60%) basis .. .. .	21s. 0d./22s. 0d. per unit c.i.f.
Beryl (min. 10 per cent BeO) .. .. .	220s./230s. per l. ton unit BeO
Bismuth .. .. .	30% 5s. 0d. lb. c.i.f.
	20% 3s. 3d. lb. c.i.f.
Chrome Ore—	
Rhodesian Metallurgical (semifriable 48%) (Ratio 3 : 1) .. .. .	£15 5s. 0d. per ton c.i.f.
Hard Lumpy 45% .. .. . (Ratio 3 : 1) .. .. .	£15 10s. 0d. per ton c.i.f.
Refactory 40% .. .. .	£11 0s. 0d. per ton c.i.f.
Amblygonite basis 7% Li <sub>2</sub> O .. .. .	£13 5s. 0d. per ton c.i.f.
Smalls 44% .. .. . (Ratio 3 : 1) .. .. .	£11 15s. 0d. per ton f.o.b.
Baluchistan 48% .. .. . (Ratio 3 : 1) .. .. .	
Columbite, Nigerian quality, basis 70% combined pentoxides (Ratio 10 : 1) .. .. .	Nb <sub>2</sub> O <sub>5</sub> : Ta <sub>2</sub> O <sub>5</sub> 170s./175s. per l. ton unit c.i.f.
Fluorspar—	
Acid Grade, Flotated Material .. .. .	£22 13s. 3d. per ton ex. works
Metallurgical (75/80% CaF <sub>2</sub> ) .. .. .	156s. 0d. ex. works
Lithium Ore—	
Petalite min. 3½% Li <sub>2</sub> O .. .. .	50s. 0d./55s. 0d. per unit f.o.b. Beira
Lepidolite min. 3½% Li <sub>2</sub> O .. .. .	50s. 0d./55s. 0d. per unit f.o.b. Beira
Amblygonite basis 7% Li <sub>2</sub> O .. .. .	75s./85s. per ton f.o.b. Beira
Magnesite, ground calcined .. .. .	£28 0s./£30 0s. d/d
Magnesite Raw (ground) .. .. .	£21 0s./£23 0s. d/d
Manganese Ore Indian—	
Europe (46% 48% basis) 60s. 0d. freight .. .. .	73d./75d. c.i.f. nom.
Manganese Ore (43% 45% .. .. .	69d./71d. c.i.f. nom.
Manganese Ore (38% 40% .. .. .	nom.
Molybdenite (85%) basis .. .. .	8s. 11d. per lb. (f.o.b.)
Titanium Ore—	
Rutile 95/97% TiO <sub>2</sub> (prompt delivery) .. .. .	£29 0s. 0d. per ton c.i.f. Aust'n
Ilmenite 50/52% TiO <sub>2</sub> .. .. .	£11 10s. per ton c.i.f. Malayan
Wolfram and Scheelite (65%) .. .. .	140s./150s. per unit c.i.f.
Vanadium—	
Fused oxide 95% V <sub>2</sub> O <sub>5</sub> .. .. .	8s./8s. 11d. per lb. V <sub>2</sub> O <sub>5</sub> c.i.f.
Zircon Sand (Australian) 65-66% ZrO <sub>2</sub> .. .. .	£16/£16 10s. ton c.i.f.



the range then being quoted on the market, with the result that prices were immediately marked down. The amount involved was stated to be 350 tons and it is believed that part of the sales were made on the basis of a price of 145s. per 1-ton unit (10s. below the price then current) and the rest about 5s. cheaper.

The sale has been widely criticized as contrary to the government's declared policy of avoiding any disruption to policy when prices are marked down. It has come at a time when the confidence of buyers had gradually been restored by a year of comparatively stable prices and is the more regrettable in view of the depressed condition of the U.S. steel industry and the less assured outlook for world trade. How soon the market settles down again must depend to no small extent on the future selling policy of the Board of Trade.

#### NEW ALUMINIUM PROCESS

Péchiney has announced that a pilot plant will operate early next year to produce aluminium under a new process. This process, on which the company's engineers have been working since 1951,

is a carbon-thermal reduction of aluminium oxide, which is stated to be considerably different from the electrochemical process under development by Aluminium Ltd.

Péchiney's process was developed in the laboratory stages with a power which was gradually stepped up from 120 to 3,000 kilovolt-amperes. Development was sufficiently encouraging to warrant the construction of a pilot plant equipped with furnaces of between 10,000 and 20,000 kilovolt-amperes. Aluminium produced under the new process had a normal purity, while its titanium content was considerably smaller than that obtained by classical processes. Operation of the pilot plant will help to determine whether, as is hoped, aluminium can be produced at less cost than in the past.

Péchiney, which has already worked out a number of processes to improve aluminium techniques, is reluctant to discuss the potential consequences of the new process. Experts believe that one result could be a considerable reduction in the investment required to build an aluminium plant, another possibility being that less power might be required to produce aluminium.

### COPPER • TIN • LEAD • ZINC

(From Our London Metal Exchange Correspondent)

The most notable price movements during the week have been for cash tin and cash zinc, both of which are generally attributed to the continuance of the dock strike in London. Although other prices have not moved to any extent, the undertone of the copper market is distinctly weaker, whilst that for the other three metals remains steady.

#### COPPER WEAKENS

The announcement last week that the U.S. customs smelter price had been reduced to 31 c. had little immediate effect upon the market as it had already been discounted and, in fact, over the weekend a very much firmer tendency prevailed both in the U.S. and on the L.M.E. partially due to "bear" covering by people who had sold against such a reduction. On Tuesday night, however, the U.S. producers unexpectedly lowered their prices from 33 c. per lb. to 30 c. per lb. and this gave rise to renewed weakness in London. With the announcement of the price reduction, Phelps Dodge announced that they had only been working at about 94 per cent capacity since the recent strike and that they were now prepared to reduce this figure to 90 per cent. Here again, as was the case with the Rhodesian announcement last week, it was felt that this was too little and underlined the fact that the present position of over-production already reflected some unannounced cutbacks by producers.

As is already the case, with a firm market consumers bought considerable tonnages of copper over the weekend but as soon as the price showed signs of falling back they withdrew completely from the market. The London dock strike has not yet had any effect on copper although it is known that con-

siderable tonnages of metal are either lying in the Thames or have been on-carried to Continental ports. In spite of this, stocks showed a further slight rise of 48 tons at the beginning of the week to a total of 10,075 tons.

In Chile the strike at Chuquicamata continues, with the company having withdrawn its offer of last week of an approximately 25 per cent increase. The situation now is that the workers' demand stands at 32 per cent, whilst the company have offered 18 per cent and they are discussing the appointment of a mediator and the scope of his mandate: it now looks as if the strike will run the four weeks which has become usual for such events in Chile. With no expectation of any difficulties in the supply of copper from Rhodesia or Katanga, market opinion has become progressively more "bearish" and if, as is expected, U.S. customs smelters reduce their price to below that of the producers, the London market can quite easily shed another: £5 to £10 per ton.

#### TIN BACKWARDATION RISES

In contrast to copper, the London dock strike has affected the position in the tin market and with a large proportion of available stocks, which fell a further 150 tons last week to 9,095 tons, in the hands of the buffer stock manager, a shortage is developing in the nearby positions which has created the establishment of an increasingly large backwardation and it is considered that this situation is likely to continue for several weeks. In general, consumption remains satisfactory and with sales in Singapore showing little increase over the rate prevailing in September, it is felt that a shortage of metal may develop before the end of the year.

On Thursday the Eastern price was equivalent to £804½ per ton c.i.f. Europe.

#### OUTLOOK FOR LEAD-ZINC PRICES

In spite of reports from the U.S. that the consumption of zinc is unsatisfactory and that the price there is only being maintained owing to the production currently being lost through strikes, the market in London has remained relatively firm with a substantial backwardation being established between the current position and three months and also between the current position and the end of the year. Some operators attribute the increasing back to the London dock strike, but others feel that it is due rather to the technical position of the market which is unlikely to alter in the near future.

After its relatively sharp fall the lead price has remained steady but, with the fears of more arrivals of Continental metal, the contango appears to be firmly established. In general, it appears to be the considered opinion that the prices of the two metals are likely to come closer together through a fall in the zinc price. As mentioned last week, operators are still reluctant to deal beyond the end of the year owing to the introduction of the new contract and this fact is lessening the selling pressure on the market.

The latest statistics from the U.S. give a mine production of lead in August of 17,200 s.tons of recoverable metal which is an increase of some 7 per cent over the July figure. For zinc, the strikes affected the production figures for September, which totalled 60,004 s.tons as against 63,840 s.tons in August. Domestic shipments fell to 58,137 tons from 64,287 tons but with exports, etc., somewhat higher stocks decreased to 192,466 tons against 200,644 tons at the end of the previous month.

The figures for the first ten days of imports of lead and zinc against the fourth quarter U.S. import quotas indicate that, with the exception of Peru, imports are being maintained for lead ore, zinc concentrates and lead metal but that the pressure to import zinc has stopped as the only country utilizing any of its quota under this heading is Canada. It will be interesting to see whether this picture alters by the end of the year in view of the unfavourable statistics published from the last Geneva meeting.

Closing prices are as follows:

	October 6		October 13	
	Buyers	Sellers	Buyers	Sellers
COPPER				
Cash . . . .	£223½	£224	£222½	£223
Three months . .	£225½	£225½	£224½	£224½
Settlement . .	£224		£223	
Week's turnover	11,475 tons		11,525 tons	
LEAD				
Current ½ month	£66½	£67	£66½	£66½
Three months . .	£68½	£68½	£68	£68½
Week's turnover	11,275 tons		8,425 tons	
TIN				
Cash . . . .	£804	£805	£808	£809
Three months . .	£800	£801	£798	£799
Settlement . .	£805		£809	
Week's turnover	770 tons		815 tons	
ZINC				
Current ½ month	£87½	£87½	£88½	£89
Three months . .	£87½	£87½	£87½	£87½
Week's turnover	4,350 tons		5,500 tons	

## Mining Finance

## Good Copper Dividend Season

The October final dividend season for the Northern Rhodesian copper companies has been a generally good one. There have been little or no signs of any purse-tightening because of the less buoyant profit outlook for the current financial year, not to mention the political situation. Market forecasters thus found themselves very near the mark in all cases but Bancroft where a burst of optimism from Johannesburg seems to have warped their judgement. The maiden dividend of 1s. net of Rhodesian tax from this young mine was, in fact, eminently satisfactory in view of its initial technical difficulties, its year's production shutdown and the considerable financial burdens that are resultantly being carried.

The profits and dividends of the seven copper companies are shown in comparative form in the accompanying table. The dividends are given net of Rhodesian tax because it is in this form that they come to non-Rhodesian shareholders less, in the case of U.K. holders, tax at 7s. 9d. in the £ as reduced by double tax relief. The current yields offered after allowing for the dividends still included in the prices are 13 per cent for Roan at 6s. 4½d., 14.8 per cent for Rhokana at 50s. 7½d., 12.7 per cent for Rhodesian Anglo American at 63s. 9d., 10 per cent for Rhodesian Selection Trust at 9s. 9d. and 5.8 per cent for Bancroft at 17s. 7½d. There is no public market in Mufulira and Chibuluma.

	Net Profit		Net Dividend*	
	1959	1960	1959	1960
	£	£	s. d.	s. d.
Bancroft .. .. .	106,248	3,693,003	—	1 0
Chibuluma .. .. .	1,144,676	1,734,074	—	—
Mufulira .. .. .	3,964,418	5,654,107	3 5½	4 11
Rhod. Anglo American .. .. .	3,854,213	7,134,552	5 0	8 0
Rhod. Selection .. .. .	1,672,687	2,432,499	0 8½	0 11½
Rhokana .. .. .	5,625,326	11,534,278	4 0	7 0
Roan .. .. .	2,949,485	4,112,413	0 6½	0 9½

\* After deduction of Rhodesian tax.

The high return on Rhokana looks in particular to be out of step with the rest in view of the company's big copper investments in addition to its own producing mine, Nkana. Rhokana will also have a new source of income in its current financial year because it holds 43 per cent of the Bancroft equity and 20 per cent of the Preference capital.

## EXPANSION AT BANCROFT

Apart from the £2,832,039 debit balance brought forward from June 30 last year, there was the question of financing Bancroft's future expansion. There had been no guarantee that the 3,000,000 shares under option at 20s. to Anglo American Corporation, Rhokana, Rhodesian Anglo American and Nchanga would be exercised. Now this

uncertainty has been removed under a new agreement whereby the company is lowering the option price to 17s. 6d. and at the same time the option holders have undertaken to exercise their rights when requested to do so by Bancroft. In other words, the option now definitely represents fresh funds of £2,625,000.

The 1s. distribution required a pay-out of £1,100,000 on the Ordinary out of an operating profit of £3,693,003. But it also meant that the Preference shares were entitled to their full participating rights so that there was a 12½ per cent, instead of a 6½ per cent, dividend to be charged on these, absorbing £585,938. Even so, Bancroft was able to appropriate £1,200,000 for capital expenditure so that in effect the Ordinary dividend was covered 2.8 times by earnings.

There was no tax to take into account on the profits. Nor will there be for a long time to come because no Rhodesian income tax is payable until the aggregate profits earned since the start of mining operations exceeds the redeemable capital expenditure, which amounted to no less than £20,000,000 at June 30 last.

Bancroft's production figures for 1959-60 must await the annual report next month—what a pity it is that the Anglo American group in the absence of quarterly reports do not issue such information with the preliminary profits statement—but it is now officially confirmed that the mine is sufficiently well regarded by the management, after its teething troubles, for further development and production expansion to be undertaken "over the next few years". Present plant capacity is 50,000 tons of copper per annum.

Providing that there is no collapse in the metal price and that politics allow Northern Rhodesia's great mining industry to continue unimpeded, it can be taken for granted that Bancroft will join the other Anglo group copper mines in declaring a 1960-61 interim next March. For the bold, in fact, Bancroft 5s. stock units could at 17s. 7½d.—practically at the new option price—be the best speculation in the copper share market.

## TRONOH'S NEW DIVIDEND POLICY

Tronoh Mines, the Malayan tin producer in the Cheapside group, is embarking on a new dividend policy. Formerly there have been four interims and a final. For 1960 there is now a first interim of 1s. 6d. per 5s. share which is to be followed by a second interim in January, while any final will be considered with the issue of the annual report in September. For next year the interims will be in July and January with any final to be declared at the annual meeting.

## LONDON MARKET HIGHLIGHTS

The first reaction of London jobbers to news that South Africans had voted in favour of a republic was to mark share prices down. But hardly had this been done when a sudden and quite unexpected demand for shares came in from Johannesburg sources. Prices were swiftly marked up again and an embarrassing shortage of stock was disclosed in many cases. All this happened on the Friday of last week-end and market quarters are still at a loss to explain the sudden Cape demand, but it is thought that some of it may have been a supporting move on the part of the mining houses.

Johannesburg was closed for Kruger Day on Monday of this week and a slightly bewildered London market allowed share prices to ease back a little. It was generally expected that the Cape buyers would return in force on the Tuesday, but once again the observers were proved wrong. Johannesburg appeared to have satisfied its demand and right up till Wednesday evening of this week the Cape buyers showed little fresh enthusiasm. London continued to be largely disinterested and against this background the very satisfactory Anglo American group quarterly reports passed unnoticed from a sharemarket angle.

Western Holdings, for instance, which had touched 143s. 9d. on the previous Friday wilted further to only 138s. 9d. despite the record development values. Free State Geduld (128s. 9d.), Anglo American (161s. 3d.) and De Beers (148s. 9d.) steadily drifted lower in line with the general market pattern. One of the few Golds to move against the trend was Merriespruit which came up from 2s. to 2s. 9d. at one time on rather vague rumours that some kind of

deal was pending with the neighbouring Harmony mine.

Rhodesian Coppers had the Gwelo riot troubles to contend with together with the storm aroused by publication of the Monckton Commission's report. But prices did little more than lose a few pence here and there. Bancroft eased to 17s. 6d. and some disappointment with the final dividend lowered R.S.T. to 9s. 9d. Among the non-Rhodesian issues, a drying-up of recent Cape support caused Messina to sink to a low for the year of 17s. 6d. while "Tanks" were a dull market at around 29s.

The Tin group moved narrowly in quiet trading despite the lack of political complications in this market and the fact that several expectedly good dividends are in the offing. Gopeng, however, handed over slightly to 26s. on their fourth interim. Tronoh surprisingly fell 1s. 3d. to 38s. 9d. following their latest dividend which indicated a fresh increase in the total for the current financial year.

Ghana Golds had suffered a setback in the previous week on fears that there were nationalisation moves afoot. But Dr. Nkrumah later denied categorically that Ghana had any such plans even though a socialistic line was favoured and share prices recovered for a while. Ashanti, which had been down to 16s. 6d., rallied to 17s. 3d. in active trading before drifting on subsequent days back to 16s.

In contrast to the firmness of Australian Golds, notably Lake View at 14s., the Lead-zinc issues tended to lose ground. Consolidated Zinc came back 1s. 6d. to 71s. and New Broken Hill were similarly lower at 49s. 6d.

The chairman, Mr. J. H. Rich, anticipates an appreciable improvement in the 1960 results owing to the lightening of output restriction. For 1959 a total of 3s. 1½d. was paid. Although a somewhat higher capital now ranks as a result of the Southern Tronoh acquisition, the market is naturally expecting materially more for the current year, perhaps as much as 4s. 6d.

Meanwhile, at the meeting Mr. Rich gave some up-to-date information about the company's important investments in other tin-mining concerns. They stood at a book value of £1,287,150 and had a market value last Monday of £3,590,062. They included holdings in Ayer Hitam, Gopeng, Kepong, Malayan, Southern Malayan, Sungei Besi and Sungei Way. Tronoh stand at 38s. 9d. to yield 8 per cent even on the 1959 payment.

#### GOPENG'S PAYMENTS UP SHARPLY

One of the companies in which Tronoh is interested, Gopeng Consolidated, has just brought its dividends for the year to September 30 up to 1s. 10½d. with a fourth interim of 9d. per 3s. 6d. stock unit. For 1958-59 there were only four interims, totalling 10½d., but on this occasion the market is expecting a balance payment. It will be in the current financial year, however, that Gopeng should be beginning to reap the full benefits of its Kinta and Tekka acquisitions especially now that output restrictions have been lifted.

Gopeng are currently 26s. cum dividend to yield 7.3 per cent on the distribution for 1959-60 to date. The property is not dredged. It is worked by hydraulic and in its enlarged form has considerable production expansion possibilities, while the life prospect stretches away into the very far distant future.

#### RECORD VALUES AT WESTERN HOLDINGS

Wednesday's and Thursday's batches of South African gold mining quarterly reports are chiefly remarkable for the record average development values of 1,548 inch-dwts. from Western Holdings, the unfaulted intersection of the Carbon Leader reef in Libanon's new Harvie-Watt shaft at the extreme southern end of the property and the first vital step signifying that Consolidated Main Reef, the old Central Rand mine, is nearing the end of its career.

This step is the statutory three months' notice to the South African Government in terms of the Gold Law of Consolidated Main Reef's intention to curtail its mining operations. At the same time it is stated that "while the profitable life of the mine must be accepted as very limited under existing conditions, all reasonable steps are being taken to maintain mining operations at a profit for as long as possible". A substantial reduction in the milling rate is expected "in the near future". A higher gold price would, of course, enable C.M.R. to carry on longer, but apart from this the shares must now largely be considered as a "break-up" proposition.

At Libanon the Carbon Leader zone (hitherto unworked by this mine) was cut at a depth of 6,172 ft. in the Harvie-Watt shaft. It was present all round the shaft and, in all, four conglomerate bands were sampled. They gave in order of intersection 34 inch-dwts., 47 inch-dwts., 150 inch-dwts. and 19 inch-dwts.

These are admittedly unpayable, but there is now at least a hope that Libanon

may be able to add some economic tonnage from this horizon to the Main and Ventersdorp Contact reefs on which its career to date has been based.

#### ZANDPAN OPTIONS NEXT MONTH

In a reminder to shareholders that during November they can exercise the options that attach to the 10s. shares, the directors of Zandpan summarise the financial position of this developing Klerksdorp area gold mine in the Anglo-Transvaal group. The options confer the right to take up two shares at 12s. 6d. for every three held. The new shares are underwritten so they represent the potential accrual of £2,500,000 of new funds. Out of this a short-term loan of up to £1,000,000 will have to be repaid, a loan that became necessary because of the spending of the initial capital funds of £3,000,000 by last May.

The balance of the new money, it is estimated, will be exhausted by the middle of next year, but then long-term loan facilities of £2,000,000 will be available. These should bring the mine to the stage when a certain amount of actual development on the Vaal reef will be possible. It is expected that this reef will be reached in the No. 1 shaft towards the end of the first quarter of 1961 at a depth of about 6,800 ft. In order to sink the No. 2 shaft, erect a reduction plant and bring the mine to actual production, further capital will have to be raised in due course as was forecast in the original prospectus.

Zandpan are at present quoted at 13s. 3d. cum option. They are only a speculation at this early stage in the property's career. Much will naturally depend on the kind of initial values that are brought up from the Vaal reef when it is cut in the No. 1 shaft next year.

#### WAGE IMPACT ON GHANA GOLDS

The gold mines of Ghana have passed through last week's nationalization scare unscathed, but they still have to face the consequences of the government dictated wage increase, the impact of which on Ashanti was discussed here a week ago.

More of the mines have now published estimates of how much these enforced wage rises will cost. They are retrospective from July 1. The following table shows the past three months' cost to the mines converted to a monthly basis and compared with the September working profits, which exclude these extra amounts.

	Sept. Working Profit £	Est. Monthly Wage Cost £
Ariston	45,529	6,000
Amal, Banket	483	8,300
Bibiani	2,272	6,000
Bremang	29,747	1,500
Ghana Main Reef	13,306	2,300

As may be seen, both Amalgamated Banket and Bibiani possibly could be put in the red by this new measure, although it is only fair to point out that the former's September profit was a particularly low one. The August figure was £16,909.

#### CAMP BIRD IN PRODUCTION

The new ore dressing mill came into operation this week at Camp Bird's property in Colorado. The mill will be able to handle 500 tons of ore a day and together with ancillary developments has cost some £900,000.

Ore reserves were reported a year ago as 777,000 tons, including 4.96 per cent lead, 0.535 per cent copper and 4.34 per cent zinc, but reserves have increased since and now exceed six years' supply to the mill.

The crushing unit is capable of dealing with 500 tons in an eight-hour shift, which would allow the mill's capacity to be increased to 1,000 tons at a later date.

Lead/copper and zinc concentrates will be produced separately by the mill and a long-term contract has been signed with the American Smelting and Refining Company for their disposal.

**Malayan and Southern Malayan Dividends**—Both Malayan and Southern Malayan Tin Dredging have declared a fourth interim dividend of 7½d., making in each case a total for year to date of 1s. 10½d. against a total distribution for 1958-1959 of 1s. 6d. in the case of Malayan and 1s. 3d. in the case of Southern Malayan. The final dividends for these companies were last year declared in November.

**Chenderiang Resumes Dividend**—After the lapse of a year Chenderiang Tin Dredging re-enters the list of dividend payers with a distribution of 10 per cent for the year to March 31 last as against 5 per cent in the year to March 1958. Profit before tax for 1959-60 amounted to £8,928 against a loss of £6,620 in the previous year. Taxation will, however, require £3,063 this year against £132.

**Zaapiants' New Orebody**—Zaapiants Tin Mining reports that its western exploratory drive has exposed a new orebody carrying rich values at the point of intersection. This deposit is 900 ft. from the nearest other working in which ore has been mined and is 600 ft. from surface. The company anticipate that it will be some time before the importance of this discovery can be accurately assessed.

**Broken Hill Proprietary Co.**—Broken Hill's net profit for the year ended May 31, was £A9,400,000 after providing £A5,500,000 for depreciation. Despite heavy expenditure on plant and expansion operations, the Australian demand for steel is still keeping ahead of production. Ingot steel production reached 3,500,000 tons for the year, an increase of 9.8 per cent on the previous year.

Notable in the expansion operations is the L.D. oxygen process of steel making developed at Port Kembla, in the open hearth furnaces; it is to be introduced at Newcastle, and L.D. furnaces will be installed in the new steel works at Whyalla. The complete cost of these works is estimated at £A41,000,000. A sinter plant has been completed at Newcastle at a cost of £A9,600,000 to provide improved feed for the blast furnaces. A new four-strand high-speed rod mill will replace the two-strand mill at Newcastle.

At Port Kembla, a second sinter plant has been completed and the first half of a third battery of coke ovens. The inner harbour, which is a very important work, is being carried out by the State Government and will greatly facilitate the company's operations. The rapid expansion of the industry is causing much difficulty in obtaining man-power, and the position may become acute.

Output of coal from the company's mines has substantially increased. Pilot plant work on the recovery of suitable blast furnace feed from the iron-bearing jaspilites at Iron Monarch and the Middle-back Ranges has been encouraging, and the company considers that this material has economic potential.



The Proprietors of British Patent No. 777,619 for "AN IMPROVED PIT PROP", desire to enter into negotiations with a firm or firms for the sale of the patent or for the grant of licences thereunder. Further particulars may be obtained from Marks & Clerk, 57 & 58, Lincoln's Inn Fields, London, W.C.2.

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## Rand and Orange Free State Returns for September

### GOLD OUTPUT AND PROFIT

Company	September 1960			Year ends	Current Financial Year Total to date			Last Financial Year Total to date		
	Tons (000)	Yield (oz.)	Profit† (£000)		Tons (000)	Yield (oz.)	Profit† (£000)	Tons (000)	Yield (oz.)	Profit† (£000)
<b>Gold Fields</b>										
Doornfontein	105	43,297	228.7	J	315	129,219	670.9	284	115,247	570.0
Libanon	117	27,961	67.4	J	351	83,831	202.3	327	76,558	180.2
Luipaards Vlei	68	11,864	3.8	J	204	35,852	11.1	219	38,564	17.4
Rietfontein	15	3,907	4.4	D	140	36,990	52.8	144	38,066	67.4
Robinson	46	10,260	5.7	D	402	89,105	5.1	526	110,680	166.9
Simmer & Jack	75	13,297	1.4	D	683	121,210	143.9	775	147,318	139.6
Sub Nigel	66	15,219	14.6	J	200	45,580	44.8	200	47,403	66.2
Venterspost	126	35,362	79.1	J	374	104,476	231.9	385	96,212	184.3
Vlakfontein	52	18,811	89.3	D	465	167,012	78.8	456	163,434	772.8
Vogels	85	18,326	20.0	D	770	165,672	182.9	824	185,097	288.4
West Drie	130	129,541	1080.0	J	390	371,883	3232.1	298	272,621	2272.4
<b>Anelo American</b>										
Brakpan	142	17,336	12.6	D	1,286	155,697	112.4	1,247	150,972	101.5
Dagtevis	228	46,183	223.2	D	2,083	420,979	2044.6	2,163	435,316	2131.0
East Daggas	106	18,212	41.7	D	950	161,242	367.9	901	150,504	298.5
F.S. Geduld	95	82,151	660.9	J	1,130	972,462	7798.0	972	759,576	5662.0
President Brand	116	94,356	821.8	S	1,396	1,135,276	9964.6	1,268	998,362	8585.8
President Steyn	105	39,523	165.8	S	1,222	470,875	2096.6	1,190	463,233	2328.8
S.A. Lands	100	20,854	50.1	D	876	182,093	407.3	870	181,871	513.1
Springs	96	13,349	12.6	S	913	126,981	127.0	836	128,158	115.1
Vaal Reefs	101	46,460	249.8	D	888	400,612	2094.8	798	360,437	1901.6
Welkom	100	11,852	80.5	S	1,183	373,689	906.7	1,149	352,132	956.6
Western Holdings	104	104,870	870.2	S	1,171	1,178,335	972.7	1,388	838,419	6454.6
West. Reefs Ex.	138	39,473	129.0	D	1,262	356,410	1186.1	1,169	306,117	913.4
<b>Central Mining</b>										
Blyvoor	133	86,464	652.2	J	404	262,689	1981.1	393	254,686	1920.3
City Deep	117	23,588	5.0	D	1,027	210,300	48.5	1,039	216,118	87.8
Cons M.R.	53	11,499	3.4	J	174	35,162	12.7	304	56,469	24.5
Crown	201	34,148	7.1	D	1,806	305,736	57.4	1,992	315,758	117.7
D. Roodepoort	192	35,315	52.0	D	1,736	317,854	447.3	1,716	317,229	428.4
East Rand Prop.	223	52,526	71.2	D	2,003	489,492	741.1	1,991	517,196	1081.7
Harmony	162	66,014	309.6	J	502	202,107	936.3	425	167,903	766.5
Modder East	128	12,110	L2.3	J	391	37,916	L0.6	426	40,809	8.9
Rose Deep	26	4,470	L1.5	D	220	38,915	8.7	353	47,826	L0.9
<b>J.C.I.*</b>										
Freddies Cons.	64	13,338	L33.0	D	545	120,219	L352.3	530	127,811	L333.4
Govt. G.M.A.	52	10,436	0.5	D	475	97,032	4.5	480	96,164	L12.7
Randfontein	16	2,966	2.1	D	212	41,675	25.9	323	55,423	78.9
<b>Union Corporation</b>										
East Geduld	129	37,410	232.5	D	1,190	348,249	2225.7	1,245	373,263	2514.0
Geduld Prop.	80	13,008	24.5	D	672	117,137	213.8	657	123,884	247.8
Grootvlei	223	46,160	240.7	D	1,959	406,536	2078.5	1,905	402,455	2072.8
Marievale	98	24,059	128.0	D	889	217,494	1136.1	847	208,401	1021.9
St. Helena	178	61,855	392.3	D	1,476	501,474	3115.1	1,350	410,129	2247.3
Van Dyk	75	11,863	6.3	D	663	109,145	79.2	678	127,952	250.2
<b>General Mining</b>										
Buffelsfontein	148	61,190	330.0	J	441	181,442	978.0	432	164,030	855.1
Ellaton	28	6,596	23.5	D	256	60,571	223.3	280	65,250	262.2
S. Roodepoort	30	7,177	22.9	J	91	21,781	69.5	90	21,455	68.6
Stillfontein	168	76,400	420.5	D	1,454	656,566	3476.9	1,274	614,774	3699.0
W. Rand Cons.	132	19,223	12.9	D	1,192	171,306	76.0	1,236	179,369	162.9
<b>Anglo Transvaal</b>										
Hartebeestfontein	120	56,100	323.0	J	360	167,698	958.5	270	144,435	936.1
Lorraine	82	17,429	L14.4	S	947	198,582	L224.7	927	181,291	L228.9
N. Klerksdorp	11	2,201	L3.8	D	189	10,635	L3.2	92	21,067	L77.9
Rand Leases	188	27,166	7.9	J	576	83,324	32.0	56	86,283	86.1
Village M.R.	28	3,990	L7.1	J	90	13,046	L12.1	86	14,126	3.4
Virginia, O.F.S.	129	27,232	5.8	J	321	67,577	L141.9	400	92,502	38.0
Winkelhaak	95	31,825	175.1	D	783	249,053	1208.1	667	169,673	371.0
<b>Others</b>										
N. Kleinfontein	77	10,288	0.5	D	710	91,497	4.4	743	96,687	27.8
Wit. Nigel	20	4,432	5.3	J	60	13,300	15.7	55	13,144	15.5

Gold has been valued at 250s. 0d. per oz. fine (August 249s. 7d.). L indicates loss. †Working Profit. \*Working Profit includes sundry revenue. Tables exclude profits from Uranium, Pyrite and Acid, and also production from Uranium divisions at Luipaards Vlei, Randfontein and W. Rand Consolidated.

### ESTIMATED URANIUM REVENUE

Company	Year ends	Sept. Profit (£000)	This year (cum.) (£000)	Last year (cum.) (£000)	Company	Year ends	Sept. Profit (£000)	This year (cum.) (£000)	Last year (cum.) (£000)
<b>Goldfields</b>					<b>J.C.I.</b>				
Doornfontein	J	15.0	45.0	43.0	E. Champ d'Or (b)	D	6.3*	61.0*	61.2*
Luipaards Vlei (a)	J	90.0	270.0	279.0	Freddies Cons.	D	38.0*	284.0*	315.0*
Vogels	D	52.0	486.0	471.0	Govt. G.M.A.	D	23.0*	207.4*	198.9*
West Drie	J	49.0	147.0	150.0	Randfontein (a)	D	99.6*	946.7*	958.3*
<b>Anglo American</b>					<b>General Mining</b>				
Daggafontein	D	138.8	1265.6	1244.3	Buffelsfontein	J	212.0	638.0	636.0
P. Brand	S	43.9	548.3	548.7	Ellaton	D	16.0	153.0	163.0
P. Steyn	S	59.1	735.0	716.4	Stillfontein	D	87.0	801.0	771.0
Vaal Reefs	D	137.6	1275.3	1283.5	W. Rand Cons. (a)	D	202.0	1868.6	1811.3
Welkom	S	56.2	699.6	681.4	<b>Anglo Transvaal</b>				
West Reefs Ex.	D	162.2	1458.4	1429.6	Hartebeestfontein	J	242.0	742.0	796.6
<b>Central Mining</b>					Lorraine	S	36.0	416.0	416.0
Blyvoor	J	160.0	486.0	456.4	N. Klerksdorp	D	10.0	95.5	98.5
Harmony	J	248.0	760.6	599.3	Virginia O.F.S.	J	178.9	510.8	528.2

Table includes profit from uranium acid and pyrite before loan redemption. (a) Total profit from uranium section. (b) Overall profit. \*Net revenue after provision for loan redemption.

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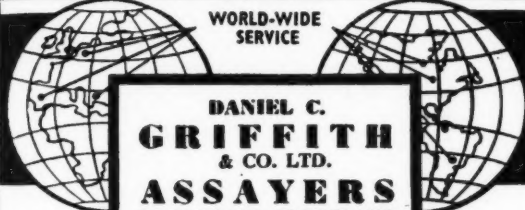
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